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Correspondence.—Wishing to make this JOURNAL a gazette of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, correspondence is solicited for publication from all who make the study of those subjects a pleasure or a profession.

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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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[OFFICIAL NOTICE.]

Wrinkle Department, Western Gas Association.

WESTERN GAS ASSOCIATION,
OFFICE OF EDITOR, WRINKLE DEPARTMENT,
MILWAUKEE, WIS., Oct. 25, 1905.

To the Members of the Western Gas Association: The next meeting of the Western Gas Association will in all probability be the last one, owing to the proposed merging of the three leading gas associations. Therefo e, every effort should be made to make it a rousing success in all respects, and it falls to my lot as Editor of the Wrinkle Department to again appeal to you for this department. I earnestly request those who have made promises of contributions to remember such as soon as possible, and I fully expect to hear from quite a number who have not made any promises, but who I know are in possession of something that would prove of value to the Wrinkle Department.

Yours very truly, B. MCADAM, Editor.

[NOTICE.]

Wrinkle Department, Ohio Gas Light Association.

OHIO GAS LIGHT ASSOCIATION,
OFFICE OF THE WRINKLE DEPT.,
719 CITIZENS BUILDING,
CLEVELAND, O., June 13, 1905.

The Wrinkle Department of the Ohio Gas Light Association is now ready to receive contributions for the 1906 collection, and a sketch or description of all devices, formulæ and methods of accomplishing objects pertaining to the gas business, is respectfully solicited.

Please send a written explanation, accompanied by any sketch, photograph or drawing, to the above address, or a description alone will suffice.

Hoping to receive prompt compliance,

Yours very truly, W. E. STEINWEDELL, Editor.

BRIEFLY TOLD.

NOTES.—

OWING to a typographical omission, referring to the business of the General Gas Light Company, of which mention was made in our issue of December 4th, the entire sense of the remarks was changed and rendered without meaning. We are informed by the management that the Company has no securities for sale. The Company has built an addition to its works, and is able to make quick shipments of all classes of arc lamps, and other goods made by it.

MR. E. C. HATHAWAY, Vice-President and General Manager of the City Gas Company, of Norfolk, Va., writing under date of the 11th inst., said: "I have just read a short article in the JOURNAL of to-day in regard to the proposed franchise in Norfolk. The following may be of interest to you: The Norfolk Railway and Light Company and the City Gas Company, of Norfolk, at a meeting of the Retail Merchants' Association, decided to adopt the following base prices: For electric light, from 10 cents per kw. down to 6 cents, with a discount of 10 per cent., and for power, from 9 cents down to 4½ cents, the same discount applying. They have also agreed to make the price for gas, for both purposes, $1 net. The companies also agree to ascertain the price charged for gas and electricity every 3 years, in cities of the same size or less in the United States, and if the average price appears to be less than the price then charged, the companies propose to reduce their

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rates to correspond; but in no case shall the rate be raised. It is understood that this price shall obtain so long as the Norfolk Railway and Light Company and the City Gas Company, of Norfolk, are left in entire possession of the field. The Retail Merchants' Association agrees to defeat the present application for the franchise, and to use their best efforts to protect the existing companies, so long as the present arrangement remains in force. When the matter was first taken up, it was thought best to endeavor to get the city to enter into a 10-year contract, but after going over the matter carefully, the above mentioned arrangement was entered into."

MR. A. G. WHITNEY, President of the St. Cloud (Minn.) Public Service Company, is to construct a gas plant in that city, the estimated cost of which is put at $65,000. The plant is to be of the coal gas type.

A CORRESPONDENT in Waterloo, Ia., writing under date of the 8th inst., incloses the following: "An event of much interest in business circles at Waterloo and Dubuque was consummated at the Commercial National Bank, at Waterloo, recently. This was the conclusion of a contract made October 24, 1905, by the terms of which George McLean, of Dubuque, President of the corporation, sold to Rufus C. Dawes, of Chicago, the entire capital stock, both common and preferred, of the Waterloo and Cedar Falls Gas and Electric Light Company. The Company's authorized capital stock is $575,000 and the bonds $150,000, making a total of $725,000. The buyers paid the purchase price and interest in cash. The corporation owns the gas and electric light plants of Waterloo, the electric transmission line between Waterloo and Cedar Falls, the electric system of Cedar Falls and the new gas works at Cedar Falls, now approaching completion. Mr. McLean became interested in Waterloo 5 years ago. The city then had the poorest lighting plants, both gas and electric, of any place of its size in the country. To-day it has the best. He first acquired the franchise of the Citizens Light, Heat and Power Company, which was about to expire because the holders, about 15 of Waterloo's most prominent and wealthy citizens, had not used it. Next he bought a controlling interest in the Waterloo Gas and Electric Light Company, then supplying the city with both gas and electricity. A new corporation, including the leading business men of Waterloo, and Mr. McLean and Mr. F. B. Harriman, of Dubuque, was then formed, which took over these properties. A new franchise for 25 years was obtained for the new Company, a new site purchased, and new and modern plants, both gas and electric, were constructed. The electric property at Cedar Falls was acquired, the generating station there scrapped and current supplied to Cedar Falls from the Waterloo station. Mr. Dawes, the purchaser of the establishments named, is the head of a syndicate which owns a dozen or more gas properties in different parts of the country. It is understood that several capitalists are interested with him in the Waterloo property, including one of his brothers, Charles G. Dawes, President of the Central Trust Company of Chicago, and former Comptroller of the Currency; Jas. B. Forgan, President of the First National Bank of Chicago; I. C. Elston, banker, of Crawfordsville, Ind., and I. C. Elston, Jr., President of the East St. Louis Gas Light Company. The last named gentleman will make Waterloo his home and will succeed Mr. McLean as President of the Company."

Diversity of Lighting in New York.

Electricity says that the specialist in lighting must feel fully satisfied in viewing New York, that whatever is marked down in the category of lighting possibilities is employed in the effort to produce illumination in the store windows of our main thoroughfares.

The diversity of the lighting systems in vogue is perhaps to be included as one of the striking features of this great cosmopolis. There is extant, particularly in the business streets, a "light hunger," if it may be so called. Gas, Welsbach, Nernst, arc, incandescent, vacuum tube and mercury vapor lamps are in constant use throughout the city. The streets are now lit by Welsbachs, with brilliant arcs at consecutive corners. Broadway is a curious scene, a medley of lights. Predominating over all is the arc, incandescent and Nernst, particularly the former two. At isolated intervals the brilliant greenish glare of the mercury vapor, or the dawnlike glow of the vacuum tube, creates a contrast on the greater background of yellowish glitter. From a technical standpoint these phases of illumination are significant, not only as actual steps in practical lighting, but as a means of judging of the degree to which each system has been perfected.

Economy as thus exemplified is to be best regarded as a belief that the best light is the cheapest. Not, however, the apparatus costing too much to install, or even the cheapest bright light, which the greenish glare of the mercury vapor amply discloses, but the most suitable to store and window illumination on the one hand, and street and corner lighting on the other. It is a good thing that the attitude preserved toward innovations is one of respectful attention and not of discreditable criticism. This is particularly true at present, for the reason, as already stated, that the demand for bright and cheaply installed light is always on the increase, not the decrease. In all probability, the city of New York is not only the most brightly lit city in the world, but the city lit by the greatest variety of systems of lighting as well.

[ABSTRACT—Continued from Page 971.]

PROCEEDINGS, THIRTY-THIRD ANNUAL MEETING, AMERICAN GAS LIGHT ASSOCIATION.

HELD IN THE HOTEL PFISTER, MILWAUKEE, WIS., OCTOBER 18-20, 1905.

FIRST DAY—AFTERNOON SESSION.

The President introduced Mr. Charles H. Dickey, of Baltimore, Md., who read his paper on

IMPROVEMENTS TO DATE IN CONSUMERS' METERS.

[For the text of Mr. Dickey's paper, see JOURNAL, Nov. 6th, page 751.]

Discussion.

The President, in inviting discussion on the paper, asked Mr. William McDonald to open the debate.

Responding, Mr. McDonald said it went without saying that he had read the paper with very great care. As they very well knew the speaker had been in the meter business about all his life, having spent more than 40 years in it, and had been interested in everything that pertained to the manufacture of meters and had given the subject a very large amount of study. The question he tried to solve was what position Mr. Dickey took in the paper. The writer said he favored the 5-A light meter, but immediately proceeded to demolish the contention. All the evidence presented in this paper seemed to carry out the remarks made at the last meeting of the Association, and those who read those remarks and compared them with the results formed by Mr. Dickey, from the people who used these meters, would find they acted as Mr. McDonald said they would. That is to say, a meter of so large a capacity with so small a diaphragm, large valves, etc., will go slow. It would not go fast; in fact it could not go fast. The rate would always be slow, but in varying percentages. Mr. Dickey showed them where the meter varied from ½ per cent., the lowest, to 20 per cent., the highest. One speaker's contention was that this 5-A meter, if used generally, could cause loss to the gas companies anywhere from 3 to 5 per cent. of the quantity passing through the meter. Furthermore he thought it was a grave question as to whether there was any place for this meter. There were some things Mr. Dickey said in which Mr. McDonald most thoroughly agreed. For example, he believed that some change could be made in the name by which they called a meter of a certain size, and he might be willing to agree that they might change the size of meters, and not make so many as they do now. In fact he might even agree that they could possibly enlarge the capacity of the present meters in the same sized cases; but he contended, so far as the 5-A meter was concerned, that it had not been proved that it was a success in any way. There were three points on the meters to be considered. Were they theoretically correct? Were they practically correct? Were they commercially correct? As far as the first two points were concerned, he did not think it worth while to argue them. Admitting they were theoretically or practically correct, if they were not commercially correct no gas man wanted them.

Continuing, Mr. McDonald said: Now if what I say is true, that we are going to lose gas by the extra large capacity meter, especially a meter as large as the 5-A meter, why is it? The difference in cost to-day between a 5-light meter and a 10-light meter is about $1.60. That is all a 10-light meter costs you. Some people buy better meters and pay a little more money, and some buy different kinds and pay a little different price, but that is about the price. I am informed by the people who manufacture the 5-A meter that it costs considerably more to make it than to make the 5-light meter; how much I do not exactly know, but certainly half as much, as between the present price of a 5-light meter and a 10 light meter, so that we have only 50 cents to 80 cents to deal with in the difference of price. There is nothing that the 5-A meter will do that the 10-light meter will not do, and do it a great deal better. I do not know how much the gentlemen in this room know of the experience had in the registration of natural gas. That has been in the past quite a different problem from the registration of illuminating gas, because much larger quantities were used. I do not like to be personal. It is something I have never been in these Associations, but somehow I cannot help being so a little bit this afternoon. Mr. Dickey said that the views which he presented in the paper are his personal views, and these are my personal views, without consultation with anyone. There are in this country many thousands of 10-light meters measuring natural gas. The meter I have produced to measure natural gas has always been protected at the tangent posts for many years, so that there is comparatively little wear there. It is put into place where the consumption is from 100 to 300 feet per hour, and it does its work year in and year out, correctly and accurately, as

nearly as any meter can be made to do its work. Now gentlemen if these things are true, and I contend they are capable of proof, where is the room for the 5-A meter? Why should 8 or 10 meter manufacturers get together and spend a lot of money to make 5-A meters? Of course, there is competition among meter manufacturers. If one meter manufacturer makes these meters, the others are compelled to do it to take care of their business. If the customer is going to buy a 5-A meter I must make it in order to supply him with it, but I do not believe in it. I will frankly say so—I do not believe in it. Of course, everything has some advantages, and there may be some things which are of interest. That there are some good points about the plan of the meter which Mr. Spangenberg has produced does not admit of question. I do not believe anyone can give study to the matter of the manufacture and development of meters without coming to some good conclusions, but the ability to pass 300 feet of gas per hour in a 5-light meter is not in my opinion what we want at all. Any gas company that will give these meters a chance to do what they are expected will find, not in 3 months, because we do not expect a meter to wear out in 3 months—although one went in 3 weeks—but at the end of 2 years one of these meters was passing 150 feet an hour 10 hours a day, or 5 hours a day for 2 years, I question whether the meter would be anywhere near correct at the end of that time; and an equal number of 10-light meters set up alongside of them to do the same work would commercially be far more profitable than the 5-A meter. I believe that this large capacity meter is a microbe. It is in the air and some of these people have got it badly, and some have it so much worse than others that it seems remarkable. I have in my possession a letter in which a meter manufacturer in addressing a customer said that these 5-A meters will pass 1,040 cubic feet of gas per hour. Mr. Spangenberg is not in it. There are only 2½ revolutions of the crank per second to bring that about; that is all. That meter, gentleman, would not last 36 hours before it would go 5, 10 or 15 per cent. slow. There is a place somewhere where this thing should be brought up and considered, and no doubt if it is right that it should be it will be; but I do not agree with Mr. Dickey even in his proposition to have a committee appointed. I may be wrong about this, but I have given the matter some thought. This, it seems to me, is the first matter that has ever been brought into the Association where it has been proposed that the Association should make up the plan of the goods for the man who produces the goods. I think that is something which should be left entirely between the meter manufacturer and his customer. Let them deal with each other as they please. It seems to me it is better for the general weal or woe that this should be the case. As to the discussion of these questions, I do not object to them, nor can anyone reasonably do so, but as to the appointment of a committee by this Association to decide what kind of meters the meter manufacturer shall make I think is entirely wrong. Of course, if you appoint a committee of meter manufacturers they will probably get together and talk this thing over, but that is not what you want. (Laughter.) Now, gentlemen, I am talking a little funny, you may say, but I am in earnest. I want you this afternoon to think this matter over more carefully than you have usually done. I presume Mr. Spangenberg will discuss the paper, and I have no idea what he will say about it, but I think he will bring some proof, from his standpoint, of the availability for use of the 5-A meter. Even in view of the fact that I am sure he is going to bring here some proof of its usefulness, I still say that I do not believe the meter has any place in the gas meter business of the world.

Mr. Spangenberg said that he did not get his copy of the Dickey paper until he started on the train, and so did not have time to think very much about it. He was afraid that the most important point in his paper of last year had been lost sight of, and he had more reason for that fear since reading Mr. Dickey's paper. Referring to the paper by Mr. Dickey, page 12 had the statement that my paper of last year brought up solely the question, "What is the limit?" (of capacity). To that the speaker wished to take exception, and to distinctly state that the major portion of his paper was devoted to showing the difficulties under which a gas manager acts in trying to obtain maximum efficiency from meters which vary in capacities and dimensions as much as was customary in the past. The evils resulting from such lack of uniformity were clearly shown. Of the 6 divisions of the paper, 5 dealt with that phase of the subject, and only one was devoted to a suggestion for larger capacities. The change was suggested simply as a factor to be considered in connection with other factors, when formulating a standard. Admitting that all past history went to show that many changes had been made, all tending to increase capacity, it clearly followed that his paper urging a standard would have been very incomplete without the information as to the limits of capacities given by him. The gas manager was interested, primarily, in uniformity, but in deciding on the final design of any machine, he wanted to consider all possible factors bearing on its efficiency. The 5-A meters were possible and probable factors, and had been so for about 2½ years. Another year's experience should show whether they are to be final factors, or will have to be modified. Page 15 cites a case of a 3-light meter doing the work of a 20-light. This may have been due to two causes; either the schedule calling for the original setting of a 20-light meter was too liberal, or the 20-light might have been of another make than the 3-light, and the two meters, therefore, have been nearly equal in capacity. But, whether for one reason or the other, the final argument was that under an established standard this incident could not have occurred. He wished to repeat again, that what he was after was a standard that should be determined from a careful study of all known facts, and he was sure that every member of the Association concurred therein. To reiterate his position he repeated the concluding sentences of his paper read a year ago: "The writer has also endeavored to establish data for an ultimate standard, that in itself would least interfere with present conditions. *Any* standard, even one which would secure no improvement over the present average efficiency of the machine, would undoubtedly save thousands of dollars." These two sentences summed up the whole paper, but he wished to quote further from his reply to the discussion of that paper: "This discussion has hinged largely on a point which, while it is of great importance, is only incidental to the main issue. The main issue is the formulation and adoption of a standard." So much for his position in this matter, which he thought was and had been absolutely plain and clear. He would now take up the question of the 5-A meters, but only in so far as that related to their practical capabilities. Considering, first, the reports on those meters mentioned in Mr. Dickey's paper, and comparing the different tables showing capacities (page 19), one engineer reported only 150 cubic feet per hour at $\frac{5}{10}$-inch loss, while another reported 225 cubic feet per hour, at $\frac{5}{10}$-inch loss, passed through the meters tested. Obviously there was quite a difference in the meters themselves or in the methods of testing. Out of 500 5-A prepayment meters received from 2 different makers and tested for capacity at $\frac{5}{10}$-inch loss, only a few ran as low as 195 cubic feet per hour, while the majority ran over 200 cubic feet and some as high as 209 cubic feet. The stuffing boxes, and the whole meter in each instance, withstood a 2½ pounds pressure test prior to making the capacity test. They should note that these were prepayment meters, through which there was more frictional resistance than plain meters, on account of the gas passing through the prepayment cut-off valve, and on account of two additional 90° bends in the flow of the current. All their 5-A prepayment meters were delivered to them guaranteed to pass 200 cubic feet per hour at $\frac{5}{10}$-inch loss, and each one was tested by the makers prior to their shipment and by them when received. It was safe to say that plain 5-A meters will average 220 cubic feet per hour at $\frac{5}{10}$-inch loss, and also that it was entirely safe and practical to run them at that speed. Working them under such conditions, they would pass as much gas as the regular 20-light meter, but when worked at more than 260 cubic feet per hour the loss would run up more rapidly than with the 20-light, for the reason that 5-light standard screws would pass only 260 cubic feet per hour, while the standard 20-light screws would pass much more. According to the statement made at the top of page 21 in the paper, a meter was shown to have passed 162,500 cubic feet in 2 months, equal to about 6 years' work of a regular 5-light meter with ordinary house consumption. The proof of the meter after removal showed 2.43 per cent. slow, or probably as nearly correct as a regular 5-light having passed an equal amount of gas. Two other matters claimed attention, the first of which was the small diaphragm question. After 5 years' trial, the small diaphragm had proven so immeasurably superior to the old style that he could hardly appreciate the theoretical objections to its use. The practical end of it was covered in his paper of last year. At least 200,000 meters were now working with small diaphragms and they were daily increasing this number as rapidly as possible. The second question was the checking of excessive consumption through a meter. His experience all went to show that any meter would register correctly up to and beyond the point of perceptible fluctuation of pressure at the outlet. When fluctuation occurs, the consumer would not be slow in informing the gas company. For low pressure distribution he believed that fluctuation at the outlet would be sufficient safeguard against excessively high speed. If provisions were to be made for greater speed than occurred at $\frac{7}{10}$-inch loss through the 5-A meters, he thought that possibly larger bearings and arrangements for automatic lubrication of the bearings would become necessary. Personally he believed that a standard of capacity based on $\frac{5}{10}$-inch loss through the

meter was the most desirable, and that th capacity should be shown on the meter badge. Starting with this known quantity, and using a table showing capacities from zero to $\frac{2}{10}$-inch, or $\frac{5}{10}$-inch loss at $\frac{1}{10}$-inch intervals, any gas engineer could arrange his own schedule for setting meters, working them at any loss in pressure that he might determine upon as the best for his purposes. He then read a report on the status of 5-A meters in Philadelphia. In the course of the mention Mr. Spangenberg said: "In reference to the fluctuation on Welsbach lights, just before I came away I made a hurried test, passing 255 feet through a 5-A meter and there was no fluctuation on a Welsbach light. I did not have time to go further."

Mr. Walton Forstall said that at the Washington meeting last year Mr. Serrill said he would give a report of a company's experience with the 5-A meter. Mr. Spangenberg gave their experience in detail, which they summarized in this way—that they were now trying out the 5-A meter on a large scale. They were not prepared to purchase meters in large sizes, and were not prepared to discuss principles in detail, and were unwilling to admit that a 5-A meter should cost much more than the 5-light. If it did cost considerably more, what a company should do was to use a 5-light meter where it was big enough, using the 5-A for 10, 20 and 30 lights. The fact that one would use a 5-light meter and a 5-A meter meant two different sizes of meters having the same size connections, which would be an advantage rather than a disadvantage.

Mr. Rollin Norris said that the details of a test of 25 5-A meters from Kansas City, on the average, two-thirds of which had been in service for 6 months, showed 3.5 per cent. slow. They were used for measuring ordinary illuminating gas.

Appointing a Special Committee.

The President—At the meeting this morning I was requested to appoint a committee of 3 members upon uniform accounting, the object being for the committee to find out to what extent the system of accounting recommended by a committee of this Association some years ago had been adopted, with any further recommendations on the subject that the committee might see fit to make. I therefore appoint as such committee Messrs. A. E. Forstall, New York city; S. J. Glass, New York city; A. P. Lathrop, Detroit, Mich.

The Association then adjourned, to reassemble at 10 A.M. the next day.

Second Day—Morning Session.

The President called the meeting to order at 10:30 A.M., and introduced Professor Balthasar H. Meyer, whose position as Professor of Political Economy in the University of Wisconsin has made him well known throughout the country in respect of the matters which he was invited to speak of to the Association. The Professor then delivered his presentation of the subject,

THE RELATIVITY OF ECONOMIC INSTITUTIONS.

[For the text of the Meyer lecture, see Journal, Nov. 20, 1905, p. 839.]

Discussion.

The President in inviting discussion asked Mr. Paul Doty to make suitable acknowledgment of the address.

Mr. Doty—Mr. President and Gentlemen: I am sure I voice the sentiment of this assembly when I say we are deeply indebted to Professor Meyer for giving us an expression which reflects absolutely the courage of his convictions. We have much to learn from what Prof. Meyer said, and I am sure we are willing to learn. I am reminded somewhat of the expression that Mr. Franklin P. Gowan made, when he was the General Counsel of the Philadelphia & Erie Railroad, in preparing a railroad sign. He put on the signboards at the railroad crossings these words: "Stop, look, and listen." Prof. Meyer prefaced his remarks with the saying of Solomon, "There is nothing new under the sun." This same philosophy gave us the statement by Solomon, "Vanity of vanities; all is vanity." What is there in life? This we must solve for ourselves. I take it that the State is the people, and the government is of the people and by the people and for the people. Educational systems differ. Prof. Meyer knows that much better than I do. The early education of the Greeks was entirely for the individual. Time has changed this. To-day the co-operative man is the successful man, the man who is willing to give what he has for the benefit of his fellowmen. I am reminded also that the thought ran all the way through Prof. Meyer's address that "Honesty is the best policy." It is a trite saying, but it is still worthy of your consideration; and I venture the thought that government ownership will be doomed to failure if dishonest. The point lies in the application. The gas companies, Prof. Meyer, I am safe in saying, do recognize the mutuality of their obligations to the public and to the stockholders, and I am positive that in this body of men there is not one who will say he does not recognize that mutuality. The gas business is peculiarly a professional business; and it is not a political business. The remarks Prof. Meyer made in connection with the operation of railways requiring high technical skill apply equally well to the gas companies. The present system of operation (private if you will) has this great advantage, that the responsibility is fixed; you will all admit that. The newspapers know that no gas company could for a moment face outraged public sentiment and live. It could not live. You have all heard the remark that "A man is known by the company he keeps." I have paraphrased that remark, and have said it before, that a man is known by the company that keeps him. Professor Meyer referred to the civic federation. I read a newspaper reference to the work of that federation, and I am sure the gentlemen assembled here will be glad to know that one of our fellow-members, Mr. Walton Clark, is a member of one of the committees of the federation. I think this will prove, Professor, that gas men are willing to co-operate with the civic federation in the information you desire to obtain. The gas companies' motto, and I do not want to be interpreted as being egotistical in saying it, is "Good service at a fair price." Gentlemen, I wish to impress upon you that it is our duty to educate the public mind upon these two points—good service and fair profit. Prof. Meyer will admit that we who are engaged in the occupation of gas engineers and in the management of gas companies should and do have primary knowledge at first hand as to what constitutes good service and that which should be a fair price. I take it, Professor Meyer, that you will agree with us that gas companies do not generally follow the line of least resistance. I say that gas companies do follow the line of greatest mutual advantage, and I think I express the sentiment of the gentlemen who are here assembled when I say that we do follow the line of greatest mutual advantage and not necessarily the line of least resistance. Mr. President, I take great pleasure in moving a hearty vote of thanks to Professor Meyer for his admirable and scholarly lecture. (Adopted by rising vote.)

The President introduced Mr. George McLean, of Dubuque, Ia., who read a paper on

TAXATION OF GAS COMPANIES.

[For the text of the McLean paper, see Journal, Nov. 13, 1905, p. 791.]

The President invited discussion on the paper.

Mr. C. H. Nettleton said he had been asked to share in the discussion on Mr. McLean's paper, and admitted he found considerable difficulty in doing so, as it was not one of the matters easily discussed. First, he wished to congratulate Mr. McLean on the facts that the paper was admirably prepared and its points clearly stated. He agreed with most of his statements and conclusions, and so far as the speaker could recall, there was but one point on which he would differ with him. That was in respect of one of the reasons assigned for the unfairness of the franchise tax, in that it would not apply to gas companies owned by individuals. That might probably be a valid reason in the Middle-West, otherwise it would not have been used, but in the East one rarely met with a gas corporation privately owned. In Connecticut he recalled but one, and that, he believed, had not been operated for years. But if a legislature were determined to pass a franchise tax, he could not believe that in New England such would be a reason that would prevent the legislation. To his mind a better reason why the franchise tax should not be passed was that in the long run whatever was paid in taxes by a public service corporation, whether gas, electric light, water or street railway, had to come out of the public who patronized the particular corporation. If the gas companies of the whole country were absolutely free from taxation, he expected they would all be selling gas cheaper than they were to-day, and if their taxes were double or quadruple what they were, the price of gas would undoubtedly be higher than it is. The public service corporation to-day in most places asked a price for its commodity that would give the owners only a fair return on the money invested, under which conditions, if the taxes were excessive, the next reduction in price was likely to be postponed until the consumption had increased to a point to make up for the excess charges. According to Mr. McLean, "The true rule is fair rates and equal taxation, and this means taxation of the public service corporations according to the rule applied to property generally, whatever this rate may be." And there was as the author stated, a tendency towards a franchise tax. Several States, notably New York, had adopted it and probably the custom would spread. As they disliked to have it enforced, it was up to them, as the managers of one line of public utilities, to try to prevent it. Personally, he be-

ieved the surest way was to be not only fair in the matter of making out the statements on which taxes were to be levied, but to be even liberal. They ought to make up their minds to pay fully as much in proportion to the value of their plants as anyone else in their respective cities, and he thought it would be a matter of policy if they paid somewhat more. Such a course, if followed through a series of years, was bound to produce a favorable impression on the assessors and the other people who managed city finances. With such a practice to refer to, an appeal to the unfairness of assessing a public utility more than other property would make more impression than if the company had tried through a series of years to avoid the payment of all that it could. Where a liberal policy was followed the gas company would be one of the largest taxpayers, in some cases even the largest, which fact could be used to very good advantage in many ways, particularly along the line of staving off a questionable increase in taxes. Another point made by Mr. McLean was that all taxes paid by any public service corporation should go to the city or cities where that corporation does business. The company is strictly local. It made its money from local people and all that it contributed to the public treasury should go, he thought, not only as a matter of policy, but of right, to the city in which it is located. In the whole matter of taxation he believed the best course for them to follow, at least those located in places of 100,000 people or less, where the personal element counted, was along the line of liberal treatment. By that he did not mean extravagance, but a good, liberal policy, showing a willingness to bear their full share of the public burden. In that connection he would instance a matter. In Connecticut, through a mistake of the man who drew the bill, the taxes on the street railways went to the State, and none of the taxes were received by the local cities where the railways were operated. Until very recently many of these roads were owned by individual companies, and the speaker knew through personal knowledge, being a director in a small company, that the street railway companies considered themselves at a very decided disadvantage compared with the gas, electric light and water companies, for the reason that they did not pay local taxes. That has been largely changed, however, as the street railways were going into the hands of the New York, New Haven & Hartford Railroad to a large extent, and many of them were already owned by the Connecticut Railway and Lighting Company. The argument did not now apply closely, but when the companies were owned individually it applied very strongly.

Mr. A. E. Forstall, in speaking to the question, said that in connection with Mr. McLean's true rule for taxes it might be interesting to note that such was exactly the rule followed in Great Britain, as far as he understood conditions there. All taxes in that country were based not upon the real value of the property but upon its earning value. To determine what rate of taxation should be imposed upon a gas company, the first step was to determine what the property of the company could be rented for to a hypothetical tenant, as the English called it, in which way the taxation of a gas company was placed as nearly as possible upon exactly the same basis as the taxation of any other piece of property in a community. Regarding the franchise tax, it seems to him a good way of combating that would be to omit from the statement of assets of gas companies the specific averment that the franchise was valued at so many dollars and cents.

Mr. G. W. Clabaugh thought the franchise tax question was a most difficult one and while the courts throughout the country had decided that they should take the value of their capital stock and from it deduct their tangible property in order to arrive at the value of the franchise, was all very well in a sense, but these franchises ran over 25 years, or more or less, as the case might be. Therefore, he thought that after a franchise had run for 20 years it evidently was not as valuable as it was in the beginning, but from the way the valuation was arrived at it seemingly was as valuable if not more so in its last year of existence than in the first. If the business had been successful, the stock was evidently worth more money than at the beginning, but if they tried to sell bonds in the 23d year of a 25-year franchise, he did not think one could get as good a price as one did at the beginning, or after the company had been in business for a year or two, to demonstrate that the business could be run profitably. He thought with Mr. McLean that a tax on the gross receipts was the only equitable one for a franchised corporation, as it put them on a par with other public utility corporations. As had been said, it was very largely a question of politics—the fellow who is nearest the tax assessor. It was not a question of what their values were, for he knew of cases where men had sworn to statements as to the question of the franchise, and there was no increase in the value thereof, yet they trebled the returns. He knew of a case where a man appeared before a tax reviewing board in order to have his assessment lowered; and his complaint was a just one. He talked for a half hour, explaining the best way he could why his taxes should be reduced, and the question was submitted to the board. A member asked, "What do you think about reducing this assessment?" One of his associates asked, "What assessment is that?" "The assessment of this company," was the reply. "I didn't hear anything about it," said board member No. 2. No. 1 blurted out, "The man has been talking about it and explaining it; didn't you hear him?" Said No. 2, "I hadn't any time to listen to him; I am busy." When you go against a proposition of that sort, what are you going to do? He believed with Mr. Cowdery—be fair; be more than fair; let the gas companies pay their full share of taxation. But it is the hardest thing possible to cause men to believe we are making only fair returns, and that is why corporations are on the defensive at all times. They are compelled to be. No matter how honest or fair they may be, they are attacked from all sides. They want to be fair and wish to give and receive a square deal, but they do not get it. "Bill" Nye had put it in a good way when he said that a little town starting out in a country place somewhere, with everything lying dormant, after a while commenced to throw bouquets to manufacturers to come and establish a plant in the town. A company came in and invested $100,000 in equipping a railway. An individual arrived who bought a piece of property for which he paid a few thousand dollars. Probably he was a foreigner. He paid taxes on the property, but did nothing to develop the place. The street railway company went on from year to year, making scarcely a living, but enhancing the value of that man's property. A gas, a water and an electric light company came in to boom this property, and in the course of time that real estate became worth $100,000. The man did nothing whatever to build up the town, but if any of the corporations happened to be making 6 or 7 per cent. on a fair valuation, they were charged with robbing the people. The other fellow was a very astute man. It was the corporations that made the town, and there was no doubt about it that the corporations and people should be one in feeling at any rate, and every manager should understand that he must be fair with the people, that he had no secrets to hide. They should not let the idea get out into the world that they were always trying to hide something from the people. They were not hiding anything, for they had nothing to hide. Be fair and honest, and they knew what would be the result. As the Irishman said, "Honesty is the best policy; for, begorra, he had tried them both."

The President said he had been asked to announce that there was quite an exhibit of gas appliances located partly in one of the stores in the Pfister Hotel, and also in the basement of the offices of the Milwaukee Gas Light Company, the Gas Company having donated the use of its exhibit rooms for such purpose. Those who wanted to investigate the new things which were upon the market could find them there. The Power & Mining Manufacturing Company, of Milwaukee, extended a cordial invitation to any who were interested in large gas engines to visit the plant at Cudahy, a suburb of Milwaukee.

The Secretary read the following telegram from Mr. Charles R. Faben, of Toledo: "I thank you for your kindly worded message, and please express to the Association somewhat of my sense of appreciation for the honor conferred, and my very serious regrets at the lack of opportunity to say some words in person."

Mr. E. G. Pratt, chairman of the Committee on Entertainment, made a formal announcement, and the meeting adjourned to 2:30 o'clock.

(To be Continued.)

State Supervision of Gas and Electric Companies.

[A paper read by MR. JOHN L. WILKIE, New York, at the First Annual Meeting, Empire State Gas and Electric Association, New York City, October 31, 1905.]

At the last session of the legislature of the State of New York a law was enacted establishing a Commission of Gas and Electricity, the title of the act specifying that such commission shall have "power to regulate the price of gas and electric light and certain other electric services, and to provide for the control and supervision of gas, electric light, and other electric corporations." In accordance with the terms of the act, the governor of the State has appointed the three commissioners provided for; they have duly qualified, organized their office, have entered upon the discharge of their duties and the experiment of governmental supervision of these companies in this State is well under way.

Although it is fair to speak of the act as an experiment in New York State, it is not a new idea or a new proceeding by any means. For a long time Great Britain has exercised a close supervision over the gas companies of that country, and in our own country the State of Massa-

chusetts established a Board of Gas and Electric Light Commissioners in 1885, which has exercised continuously for the past 20 years a like supervision to that just provided for in this State.

We hear so much to-day about municipal ownership of so called public utilities, in which the supply of gas and electricity is included, and the clamors of many voices make so great a noise, that the worked out and thought out opinions of men, who, like the members of this Association have become experts in the subject, are practically unheard.

This is not the time to go into any discussion of the general question of municipal ownership, but in connection with our subject it may be fair to say that consideration of the question by persons like yourselves, who while engaged in the special business, are yet good citizens and open minded men, has led to the conclusion, that not municipal ownership and municipal operation, nor municipal ownership and private operation, but private ownership and operation with governmental supervision, is the best method, in this country at least, for the supply of the so-called public utilities.

Aside from our fundamental belief that that country is governed best which is governed least, all experience shows that with us at this time the government never does work as well as private owners do. The lacking sense of responsibility, of accountability for operation and results, of self-interest, all militate against the government work.

In any one of your companies the gas superintendent or the electric superintendent is each held responsible for the conduct of his department by the general manager, and he in turn by the board of directors, and if trouble arises in operation, or if results are not satisfactory, the person responsible can be at once removed, without politics interfering to prevent his discharge, or the possibility of an appeal to the courts with a tedious litigation, and the possible reinstatement because of the violation in his discharge of some statute or technical requirement.

With this well-established belief in the wisdom and expediency of private ownership of gas and electric companies, prominent and influential men engaged in that business have from time to time, both at National and State conventions of Gas and Electric Associations and at other public meetings, and by private articles and papers, called attention to the propriety and need of State supervision. The reasons for this supervision may be roughly divided into two classes; one, the protection of the public at large, the other the protection of the private owners.

That there has been and is to-day need of the former is unquestioned. In the period of consolidation and exploitation of industrial enterprises covered by the past 10 years the properties of gas and electric companies have not escaped the hands of the promoter, and readjustments of security issues, with the endeavor to earn interest and dividends at the expense of the public, have been not uncommon. On the other hand, arbitrary and unjust assaults have been made upon properties which have been prudently and carefully managed, either through senseless legislation, or local attacks by politicians.

It was in view of all these facts that certain of the companies represented in your membership advocated for several years the adoption in this State of proper legislation covering the matter of reasonable and just State supervision and protection. Certain companies also appeared before the governor on the public hearing granted by him prior to his approval of the act appointing a Gas Commission as passed by the legislature, and while they claimed that the act was not perfect, that it bore unfairly on the companies in some respects and gave them inadequate protection in others, yet, believing in the general principle involved, they advocated the measure, in the full hope and belief that it would be justly and fairly construed by the commissioners appointed to enforce it, and that imperfections and omissions could be corrected by subsequent legislation. Now, with the act a law and with the commissioners engaged in its enforcement, certain queries as to the scope, nature and method of the exercise of the jurisdiction conferred, have become most pertinent.

With the 20 years' experience of the Massachusetts Commission as a precedent and a guide, the matter is not wholly one of experimentation. It is not too much to hope that the New York State Gas and Electric Commission will profit not only by the good work done by the Massachusetts Commission, but also by its mistakes. Furthermore the whole question of State supervision has been one much before the courts in the last few years, largely on questions arising under the Inter-State Commerce Act, and as a result certain general principles have been or are being evolved which must greatly aid the new Commission in determining the questions which will be brought before it.

It is as impossible, as it would be unwise, to attempt to discuss here anything more than one or two fundamental questions as to the jurisdiction of and the principles which ought to be applied by the Commission in the exercise of its high and important duties.

In the first place the Commission is a subordinate of the legislative division of our form of government, appointed by the legislature to carry out certain inherent rights and powers of that body, which it cannot itself with justice and wisdom properly exercise.

The right of the legislature to supervise corporations which it has created, and when they are companies supplying the public with gas and electricity, to fix the maximum price chargeable by such companies for their product, is with certain limitations unquestioned. Among these limitations is the requirement that it must treat all persons of the same class, under like circumstances and conditions, in the same manner; and another is, that in fixing a maximum rate, it must be "just and reasonable compensation" to the person supplying the gas or electricity.

That this legislative right, subject to the same limitations, may be delegated as an administrative function to a commission—although not entirely conceded—is reasonably well determined.

In the event that these limitations are exceeded—if for example the maximum rate fixed is felt by the person supplying gas or electricity to be unjust or unreasonable, the question then becomes a judicial one and the courts will determine on evidence what the fact is. The State cannot do that which in law amounts to the taking of private property without giving just compensation therefor.

1. The question of what just and reasonable compensation is in a particular case, is one very difficult at times to determine. For example, in the recent legislative investigation of the New York city gas companies, the committee reported a price based upon "the proper costs for manufacture and distribution" and "a reasonable return upon their capital investment in their gas making business."

An analysis of the figures upon which the price recommended was based would seem to indicate that there had been excluded altogether any allowance for depreciation or replacement of plant, and that the bare cost of manufacture, distribution and general expense had been taken as cost.

To those of you who have seen new methods of manufacture crowd in year after year and who have measured the life, certainly of an electric plant kept up annually in the best repair, by a brief 10 years, such a method of determining cost as adopted could hardly prove reassuring as a basis of fixing price.

The question, however, is broader than the above determination would indicate. Charges for gas and electricity, like all charges in any business or profession, are determined by considerations of business policy. For your lighting service, let us say that you need 1,000 kw. capacity, all of which is in use from 5 to 9 P.M. of your winter days. By what hard and fast rule can anyone determine the price at which you ought to supply electric current for the remainder of the 24 hours? If you assume the possibility of a power load in the ordinary business hours, say from 7 A.M. to 5 P.M., and fix a price for that, what price again will you fix for the man who wants a breakdown connection from 12 midnight to 7 A.M.? There must of necessity be given to the manager of such a business a wide discretion in fixing rates, so as to meet the demands of his business community.

Sometimes in the exercise of this discretion a rate is fixed much below what would be reasonable and lawful, as when a company pushes into a new territory which it hopes to develop, or where it offers, for example, a rate for electric current below cost to have a manufacturing plant established in its territory, hoping for a future profit in the increase in the community. Sometimes a company, to meet competition, will make rates in the competing territory that would bankrupt it, if applied to its entire business. Many times in this State that very bankruptcy has ensued from just such competition.

Again we have a company managed with such skill, industry and foresight that its cost charge is below that of any other company similarly situated. Are these qualities to be penalized, as in some cases in Massachusetts they seem to have been, and the more capable and efficient the management, the less is is actual return to be, and the same its net reward as that given to the inefficiently managed company!

Suppose also that the growth in population of the community where the business carried on is attributable in some measure possibly to the advantages offered by the company, or to any other advantage which causes an appreciation in the value of the property of the company, is that to be remorselessly taken by the application of a narrow rule, so that the owners of this property, who may lose by any misfortune, can never gain in common with all the community by any good fortune?

The true rule ought to be, as said before, that a "just and reasonable

compensation" should be allowed in all cases, and this whether the percentage of profit is large or small. No one will deny that cost of manufacture and of distribution, plus general expenses and taxes, and a fair and just allowance for ordinary extensions or improvements, accidents and depreciation, are elements and important elements in determining price; but it must be apparent that neither the State nor a community has any right to confiscate that portion of a just and reasonable compensation which is in excess of cost as established and the profit allowed. Not only would this be illegal as a taking of private property without just compensation, but it would be foolishly unwise as discouraging economic advance and grossly unjust and unfair to a valuable public servant. In the clamor for municipal ownership it has been deemed necessary to revile and treat with contempt all public service corporations. And yet it is demonstrable that the great material prosperity of our country is due more largely to the adventuring of the investors in these companies than to any one other cause. Aside from the companies interested in transportation, there is no interest that is keener for the best development of the community in which it is located than one of your companies.

The interest is a selfish one, if you please, but none the less is it a real interest, and intelligence of a high order is continuously brought to bear on the problem of how the city can be made more attractive to people, for the more people the larger the market for your gas and electricity. Is there a chance of getting a mill to locate in your community? Your directors subscribe to its securities to induce it to locate with you. Is there a chance for a new railroad connection? You aid in solving the question of route and franchise and consents, and whatever may be helpful in that connection. The matters of your service are daily problems. How can you make it more efficient, more desirable and less costly? And yet with all this, the gas man now as for two generations is an object of contumely.

Here in the State of New York the opportunity is now presented of your standing manfully as valuable citizens, claiming your just dues before a body which is quasi-judicial, and where you can get a fair hearing and where you can be awarded fair treatment.

2. Not alone, however, is the price of your service a matter that has been confided to this Commission. The question of the value of your property is also one that is bound to come up for consideration, as for instance in connection with the issuance of securities for the purchase of existing properties or for extensions and additions to your own.

Only a small proportion of the value of a gas and electric company is represented in the tangible, physical properties; the greater proportion is represented in its earning capacity. This earning capacity again depends upon the price which the company can charge for its product, the volume of its business and the expenses of doing that business. From this it must be quite clear that the value of its property is determined by the price of its products, and not the price of its product by the value of tangible property.

The State of New York has recognized this fact, and in its special franchise tax has provided for the ascertainment of these two elements which enter into value, and by methods which are only known to the appraisers the value of this right to supply and charge a reasonable price to the community is fixed and taxes are levied thereon.

Incidentally it may be stated that there are cases where these assessors seem to have determined that the total value of a property is to be determined by capitalizing the earnings of some accepted percentage, to deduct from this amount the value of the physical properties as determined, and say that the remainder represents the value of the special franchise.

Such a method is as unfair and unwise as is the attempt to base price upon cost; for here again the same advantages which may belong to any company of right, increase of population, ability in management, whatever may cause an appreciation in value of the company's property, are absolutely lost sight of, and all inspiration to able and economical management is taken away, by reason of the fact that the only result is to subject the company to a higher tax. The value of physical properties may be so great that to earn a reasonable return thereon might require an unreasonable price, but that would be no justification for charging such a price; conversely, the value or the cost of replacement value may be so small that a reasonable price may mean a large return, which equally should not be confiscated because of this fact.

In the ultimate analysis the value of the entire property must be determined by its earning capacity, and this, of course, by the price charged. Assuming this to be the principle governing the determination of value, there is one practical consideration in connection with the subject that is of importance, arising out of the allowance of the issuance of securities, bonds or stock, covering the value of the new property.

Under the system in force in Massachusetts, new securities for extensions, improvements or otherwise are not allowed to be issued at par, where the market price is such that a premium may be realized upon them. Sometimes these are required to be sold at public auction, or a price is fixed below which they cannot be sold. In all official tabulations, however, the par value of the securities is the only figure taken, and these may show an apparent earning of a large percentage, whereas in fact the real amount is much less. When dividend rates come to be matter of newspaper discussion the rate of 8 or 10 per cent. paid is denounced as robbery of the consumer, whereas in fact all that the holder is getting is 4 or 5 per cent., in view of the premium which he has had to pay. To require that the par value shall be obtained may be perfectly fair, but to require more than that is to put the investor at an obvious disadvantage, and it can only be a question of time when he will be driven out of the market for such securities at such prices. The recent official reports of conditions in Massachusetts, where such a practice obtains not only in connection with gas and electric companies, but with street railways under control of the Railroad Commissioners of that State, are significant, and make it strongly desirable that no such practice shall obtain here.

Very sketchily indeed we have so far considered and stated our opinion on only two of the important questions that come within the jurisdiction of the State Commission.

There are many other questions of far reaching importance included within this jurisdiction, which the limits of this paper will not permit us to discuss. Among these to briefly refer to a few among them are:

1. That the reasonable price to be charged for electricity is to be determined not only by cost of the product, but by a large and varying number of other considerations which are at least of equal importance; and,

2. That the value of gas and electric properties should be based on their earning capacity.

3. The control which the Commission should exercise in the giving its approval of grants of competing franchises.

Applying the maxim that "competition is the life of trade," franchises have been heretofore granted almost indiscriminately, the result being a war between the competitors with a profitless contest in the cutting of rates, terminating finally in one of the competing companies absorbing the other, for all experience has shown that two companies will not long continue to ruin themselves for the benefit of the public; then when the final settlement is effected, there is the capital represented by the two systems, which asserts its right to earn interest. The legislative intent evidently was to provide for all the reasonable and lasting advantages that might be gained from unrestrained competition, by the legislative supervision and regulation through the commission, without the waste and loss both to capital and to consumers which must follow an unnecessary duplication of plants and such a profitless contest.

The proper rule to be applied in a case where approval of a competing franchise is asked is to require the existing company to furnish satisfactory service at a reasonable price, which will safeguard the rights and interests of the community and equally with that protect the capital expended for the purpose of supplying the public needs from destructive competition, either by a competing company or even by a municipality.

4. Regulations as to the quality of gas and electricity.

A signal evidence of the care with which this question should be investigated is shown in one of the acts passed by the last session of the legislature, which restricted the upper limit of gas pressure in the city of New York. It seems unquestionable that this act was evolved from a theory that the gas pressure was increased for the purpose of making a poorer quality of gas than the standard required by law furnish a required degree of illumination, thus entailing an increased consumption at an increased cost to the consumer. If the act were to be literally obeyed, there can be no question but that whole districts of consumers would be left without a proper gas supply. It is an absolutely demonstrable fact that, except for a small, moderately level district, it is impossible to maintain equal gas pressure at all points, within the limits prescribed by the act.

The act was obviously unnecessary, for even if the gas companies could not be trusted to maintain such a pressure as would best meet the average requirements of their districts, each consumer could readily reduce the pressure at his own connection.

In this, as in all other technical questions that may arise, the Commission must inform itself by the testimony of acknowledged experts

in the particular field. The plausibility to a layman of the statement that an inferior product is blown through the pipes to increase the consumer's bill, particularly when yellow journalism makes much of it, is no reason why grave and serious injustice should be done, not only to the gas company, but as in this particular instance to the community. Aside from these questions which arise under the act as passed, there are certain omissions that ought to be covered by future legislation.

5. For example, the act provides that, "a corporation hereafter incorporated" shall be subject to the jurisdiction of and inquiry by the Commission as to whether or not it should be permitted to exercise a competing franchise. That this needs the promptest revision so as to apply to all corporations heretofore incorporated, as well as those incorporated since the passage of the act, is best evidenced by the horde of incorporations organized immediately upon the contents of the proposed act becoming known, and which, with capital all issued, with privileges claimed to do business in many instances in every city, village, town and county in the State, lie by waiting some favorable chance to raid some honest, well managed company, which without the remedying of the act will be wholly defenseless by the Commission.

6. Another deficiency in the act is that nowhere is there express jurisdiction given to the Commission over the right of the exercise by any of the companies of the privilege of taking property for right of way by eminent domain. It is true that the privilege to the companies is an extremly narrow one at present, but for the best and most economical service, that right ought to be extended under proper supervision.

There were in the State of New York in 1904 over 250 corporations engaged in the gas and electric business, exclusive of transmission companies, and these had outstanding bonded obligations amounting to some $110,000,000 and capital stock of over $250,000,000.

Leaving out the city of New York, where the conditions are exceptional, there is probably not one city of over 10,000 inhabitants where the price charged for gas is not less than the rate which, by law, the company supplying is allowed to charge. In other words, the companies acting of their own volition have lowered rates from time to time, and it is an attendant fact that they have had an increasing output. What this means is that these companies render service to the public in a very wide sense; they play their part in inviting, in promoting and in fostering industries, with the stimulation to increased population and wealth that comes therefrom.

Since this paper was prepared a recent article has been published in the daily papers which, while treating of the general subject of industrial problems, and setting forth the rights of the community to fair treatment, has this to say about "The unwisdom of well meaning but misguided efforts to check corporate activity:

"It is impossible too strongly to insist upon what ought to be the patent fact, that it is not only in the interest of the people of wealth themselves, but in our interest, in the interest of the public as a whole, that they should be treated fairly and justly; that if they show exceptional business ability they should be given exceptional reward for that ability. The tissues of our industrial fabric are interwoven in such complex fashion that what strengthens or weakens part also strengthens or weakens the whole. If we penalize industry we will ourselves in the end have to pay a considerable part of the penalty. If we make conditions such that the men of exceptional ability are able to secure marked benefits by the exercise of that ability, then we shall ourselves benefit somewhat. It is our interest no less than our duty to treat them fairly."

When it is added that this principle of treatment, which is all that any gas or electric company can ask for, is enunciated by no less a champion of the people against corporations than President Roosevelt in his speech on the 20th of this month at Atlanta, Ga., the fairness of the rule ought to be beyond question.

It is a favorite phrase with President Roosevelt, that each individual is entitled to a "square deal," and this is all that your companies wish and all that they seek for. The importance to them and to the State of that result being obtained, is beyond question, and if this Association or its members can in any way aid in the proper solution of the questions that are to arise, if they can aid in establishing a body of principles covering the relations of the companies and the communities, they will render a high service, in an important field, at a critical time in the political and industrial history of our country.

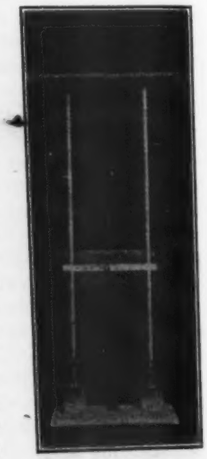
MR. GRANT RICHWINE, of Mechanicsburg, Pa., has been granted a franchise for the constructing and operating of a gas plant in Havre de Grace, Md.

A New Burette Holder.

Mr. A. T. Lincoln, University of Illinois, communicates to the *Journal American Chemical Society* the following mention of a new burette holder:

The inconvenience of the ordinary forms of clamps now in use for holding burettes has been experienced by nearly everyone who has had occasion to support these measuring tubes. By means of the burette holder herein described many of these inconveniences have been removed, and it is believed that a very simple, inexpensive and effective burette holder has been provided.

The accompanying cut illustrates fairly well the construction of the holder. The holder consists of a well seasoned block of wood, 3.5 × 9 × ¾ inches, with the ends notched back about 2 inches, thus leaving two pieces of wood at each end with a surface about ¾ of an inch wide against which the burettes rest. Two grooves on the face of the board are cut parallel for the burettes to rest in, and one in the middle at the back for the supporting rod. The holder is fastened to this rod by means of a bolt provided with a staple-head, which passes around the rod and can be tightened by means of a thumb nut in front, and hence fastened very securely to the rod. These grooves into which the supporting rod and the burettes fit are all parallel, thus securing the proper position of the holder and insuring that the burettes are always in a vertical position and parallel. The burettes are held against the wood by means of a piece of spring brass about ¾ of an inch wide, which extends across the front of the block of wood and at the same time answers the purpose of a washer for the nut. It does not require much pressure to keep the burettes in place, but this spring can be reinforced by placing a second shorter piece of brass over this and having them properly fitted.



A very marked advantage that this holder has, in addition to those already mentioned, is the ease with which the burettes may be put into or removed from the clamp, as well as moved up or down in case the meniscus happens to become hidden by the brass clamp or rendered indistinct by the wood becoming the background.

The City Gas Works, Richmond, Va.

[Communicated by MR. FREDERIC EGNER]

Whereas considerable publicity has been given of late to the alleged condition of the City Gas Works, of Richmond, Va., and as much of the matter printed is simply misleading, and to a certain extent very unfair, and whereas, the writer is in position to know the facts in the case, the following statements may be of interest to the readers of the JOURNAL. The statements are given without prejudice to either side of the controversy—for *that* is the present condition of the matter so far as Richmond is concerned. The real contest at this date is one between the advocates of public and private ownership of the gas plant, and it must be conceded that Mr. Bruce's report to the investigating committee of the City Councils of Richmond, as published in the daily papers of that city, is a very strong argument in favor of private ownership, and an argument which simply illustrates the strong position against public ownership of public utilities everywhere, so long as mere party politics may control the management of these public necessities. It is not the intention of the writer to argue the subject at this time, but rather to simply present the facts as they appeared to him when making a thorough inspection of the City Gas Works of Richmond less than two weeks ago. The writer has been somewhat familiar with the works for a number of years, and has frequently visited them, besides making the inspection of same under the guidance of their Superintendent, and by his special invitation. By comparing the facts with the report of Mr. Bruce, the reader may gain additional information on the subject, and one thing will become apparent: It certainly looks that an uncalled-for assault was made upon the professional character of Mr. Wm. P. Knowles, the very efficient and up-to-date Superintendent for something like 10 years of the Richmond works. Not to stretch this article to tedious lengths, let it be understood that to date the greatest sendout for any 24 hours has not been much, if any, in excess of 1,200,000 cubic feet.

To supply this demand, there are at the "Lower Works" (which is

the only manufacturing station) two sets of improved type Lowe water gas generators, each equal to producing easily 600,000 cubic feet of gas in 24 hours. These water gas sets are in very good order and complete in every respect, with duplicate boilers, engines, blowers, oil pumps and other accessories. In other words, the gas works can produce easily 1,200,000 cubic feet of water gas per diem *now;* and, let it be repeated, the apparatus is in first-class condition in all its parts, including hydraulic seal or wash-box, scrubbers and condensers. The coal gas plant consists of 2 stacks of 10 benches of 6's, also in good conditioa, and able to make at the least 1,000,000 cubic feet of coal gas per 24 hours. These benches are of the old, free-firing furnace construction, hence now behind the age; but when it is stated (as can be verified by looking over the annual reports of the Superintendent) that said officer has recommended modern benches as far back as 1898, a strong point will be found in favor of Mr. Bruce's report, which is practically an indorsement of private *vs.* public ownership of the city gas plant; but no less so a splendid testimonial to the foresight of the Superintendent, Mr. Wm. P. Knowles, who made the recommendation and who was not given the necessary means to carry out the same, which would ultimately have saved the city of Richmond, roughly speaking, to date at least $140,000.

These figures which are commended by the writer to the careful consideration of the City Fathers of Richmond, Va., and can be substantiated any time that these gentlemen would like to know "how" they have lost that much money for their constituents by not properly backing up their Superintendent, instead of lending aid and support to the growlers about gas, which are even found in Richmond, and that is exactly what they did, as shall be presently explained. While Mr. Bruce justly condems the antiquated, though good, coal gas manufacturing plant, he incidentally hits at the hard worked retort house stokers; but if any practical gas man will consider that they are charging an average of 330 pounds of coal per retort in 4-hour charges, and that the charges are well coked—in other words, that the "heats" appeared to be very good, the day the writer made his entirely unexpected descent upon these works—and that each man employed in the retort house must do all the work connected with 15 retorts during his shift of 12 hours' duty, bringing in the coal, taking out the coke, cleaning fires, clearing stopped ascension and bridge pipes, etc., he will understand that these men fully earn the wages paid. These are $2.75 per day for the "leading man" to $2.50 and $2.25 per day for the other men. Of course, with machine stoking, and still more so with inclined or, perhaps, the still later true "vertical" retorts, the cost of coal gas would have been much less than it is, just as Mr. Bruce truly indicates. But that this is not being done is not the Superintendent's fault, and the men themselves who do the actual work are justly indignant at the aspersions cast upon them, for the work done compares favorably with any manual labor stoking, either in New York or elsewhere. The writer, who in his younger days had personal supervision of a coal gas works in the city of New York, where as many as 600 to 848 retorts were in daily operation, and who has in person taught more men how to clean fires and draw and charge coal gas retorts than any other man living to-day in this country at least, is well acquainted with the subject of which he is writing in this connection. The exhausting, scrubbing and condensing plant of the works is in good order and ample, though somewhat antiquated in design. The coal and water gas tars are allowed to run together, hence depreciating the whole somewhat in value. But here, too, we would find that Superintendent Knowles long ago recommended the proper remedy. The means to carry the plan out were, however, not given him, again resulting in loss to the city and bearing out Mr. Bruce's argument, if I may call it such, in favor of private ownership of the gas plant, yet again reflecting most creditably upon Mr. Knowles' foresight and thorough comprehension of the best needs of the plant over which he was placed as Superintendent.

Exhauster engines and exhausters, of the Isbell-Porter type, are in good order and in duplicate, as are the boilers supplying steam to the works other than the water gas apparatus, which has separate boilers; and, by-the-way, also ample oil storage tanks, all in good order. A weak point in the coal gas plant is that there appears to be no means for concentrating and working up the ammoniacal liquor, a point that also was not overlooked by Mr. Knowles when making his annual recommendations to the City Councils. The latter did not harken to their Superintendent's recommendations until a general public howl about "bad gas" awakened them to the fact that a plant which paid *all* it made to the city had to occasionally have money for improvements, enlargements or other timely necessaries. The purifying plant was found ample in every way. In a fine modern building of ample proportions are 4 boxes, each 24 feet by 32 feet by 5 feet, fitted with modern valve gear and oxide handling machinery, all able to take care of 2,000,000 cubic feet of gas per 24 hours *and more if pushed*, and everything in prime condition. In another nearby building were found an additional set of 4 smaller boxes and 2 quite large ones, which could be used if wanted. A station meter, which had been supplied with a new drum only some little while before, was found in operation. This meter was given as 15 feet in diameter by 15 feet long. Manifestly such a meter could easily and correctly measure 2,000,000 cubic feet per 24 hours. There was, however, another meter of about 800,000 cubic feet capacity, which could have been used to measure the water gas separately, to do which only a few simple connections were wanted. Though the Superintendent had recommended this to be done several times in his annual reports, the economical minded but ignorant (of the gas business) Councils did not grant the asked for means.

As to the gas storage capacity this was found as follows: A new 2-million cubic foot storage holder was in course of erection, and approaching completion. This had been recommended by the Superintendent years ago, and again and again; the holder only came to hand in 1905. The old holders (some erected in 1851) were naturally insufficient in capacity to supply the rapidly growing gas demands of the city. There appear to be no street main pressure governors, and the attempt was made to regulate the pressure by the valve men, who had to constantly watch the gauges and turn on or off the supply as needed. This would seem to have been a weak spot in the management, until one understands the misdirected zeal in the direction of economy; for let not the writer be understood as reflecting in the slightest degree upon the integrity of anyone of the Richmoud City Councils. They acted to the best interests of their constituents, *as they saw them*, without giving the necessary weight to the fact that the art of gas making and distributing requires special training, and consists of more than shoveling coal into retorts, turning on the gas and collecting the bills. The mistake made by these gentlemen, and by every other municipal authority that ever had a gas or other public utility plant, was and is that they do not give due weight to the technical necessities of these plants. Did they but reflect that in all other business, to be successful, the men in charge must understand it, and did they but apply the same rule to these public necessities as they do to their own businesses public ownership would not bear the very general disrepute that it undoubtedly does, and justly so too, under these prevailing wrong conditions.

And so it has happened at Richmond, where year after year the Superintendent made timely, wholesome recommendations, these were generally disregarded, or only acted upon, like the case of the large, new gasholder, when it was practically unavoidable. When public condemnation could no longer be hushed that action was taken, and in the meantime the faithful and efficient Superintendent is being made a scapegoat of for the omissions of the City Councils of past years.

In the Bruce report to the authorities, Mr. Bruce is guilty (in the writer's opinion at least) of "playing to the galleries" to a certain extent, for he openly charges that the consumers did not get the service to which they were entitled. He states that the gas department would only lay mains and services, set meters and turn on the gas; but in fact, a corps of men were kept to attend to all complaints made. All complaints received the attention they would have received were the case even in the city of New York, where it will not be denied there are people who do a heap of growling no matter how good the average service might be.

Every gas man knows that, in time of "falling weather" or sudden changes from warm to cold, deposits of moisture or of naphthaline will cause trouble in consumers' services and meters, and the light being not as good as usual, the consumer quite naturally is likely to charge it to "bad gas." Poor light and bad gas are synonymous terms with the consumer, and it was so at Richmond; but Mr. Bruce in his report fails to point out this fact, "laying it on good and thick" by telling the public, through the vehicle of his report, that they are a poor, abused, ill-served community. Quoting a phrase often seen in some of our papers lately, we may remark, "*And what do you think of that?*" In his report, Mr. Bruce states that an expenditure of some $750,000 is necessary to make the Richmond supply adequate to the needs of the situation. It is conceded that certain improvements are necessary, or at any rate advisable, especially in the line of street main improvements, for the city is growing rapidly; but it must also be admitted that the present Superintendent of the Richmond city gas works has from time to time, and dating back for years, made the necessary recommendations. It would appear then that all Richmond requires to be up to any other city in its gas supply is for the politicians not

only to let their Superintendent alone but to back him up solidly, unless indeed they are perhaps anxious to get rid of the gas works by turning the same over to private owners.

Having shown that the generating capacity of the Richmond works is at present far in excess of the demand, and that even the storage capacity—including the new 2,000,000 cubic foot holder—is more than sufficient to contain a full 24 hours' supply, the conditions at Richmond do not appear so "shocking" as possibly interested parties would have other people think. It is difficult to see what would call for an expenditure of $700,000 at and for the Richmond gas plant, and with plant as described in this article, which description is absolutely accurate and true, there is evidently a great margin of difference in opinion between the expert who made that report and the writer, who is quite well acquainted with the facts of the situation. To recapitulate: Greatest output per diem, as stated by the Superintendent, about 1,200,000 cubic feet; gas producing capacity—water gas, 1,200,000 cubic feet; coal gas, 1,000,000 cubic feet; balance of plant as previously stated. Assuming that the antiquated coal gas plant were to be replaced by a modern inclined retort plant of equal capacity, this could be done for about $50,000, as the present retort house buildings can be utilized. To rebuild (in the existing brick tanks) the old holders, add Standard washer-scrubbers, and even a complete sulphate of ammonia plant and street main pressure governors might cost another $75,000. A good many miles of street mains and other accessories might be added and still leave about $350,000 not at all necessary to expend. That gas has cost more at Richmond the past few years than it should have cost was entirely due to lack of storage room and want of modern coal gas apparatus. While Mr. Bruce justly condemns "the system" under which the gas works were conducted, his strictures on the Superintendent were entirely uncalled for. Neither is the gas plant in any such deplorable condition as the report apparently makes it seem to be. However, that the report is an extremely good argument against public ownership of the city gas works, is no compliment to say, for that is about all there is to it, notwithstanding the excellent authority of the gentleman who made it.

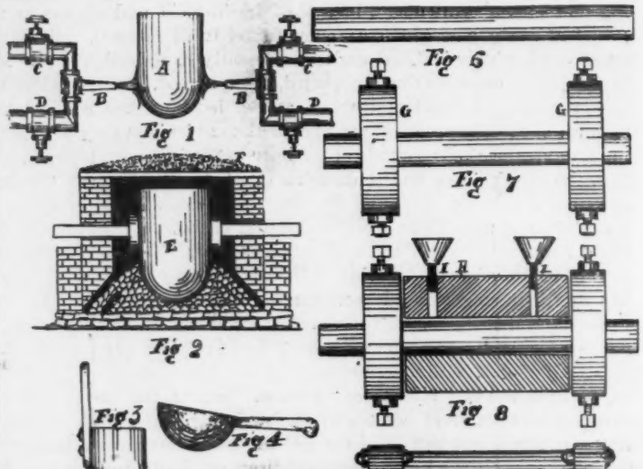
Gas as Employed in the Use of Babbitt Metal.

By "Observer."

The application of illuminating gas to the working of babbitt metal may be classed under 3 heads: First, the gas is utilized in the melting of the ingredients employed in the manufacture of the babbitt metal; second, it is used in the melting of the metal for preparation for casting forms; and, third, the gas is used in certain finishing process of the articles manufactured from the babbitt metal. Having had quite a good opportunity to travel and observe the increased usage of gas in mechanics, it may be interesting to manufacturers of gas to relate some of the conditions under which gases are employed in different parts of the country for the purposes mentioned. We will first refer briefly to some of the apparatus used. A crucible is needed in which to melt and mix the metal. The babbitt metal is made by using say 50 pounds of tin, 4 pounds of antimony and 3 pounds of copper. The cast iron pot *A* is necessary in which to melt the material, a drawing of which is exhibited in the first diagram. In some shops a charcoal or coke furnace may be used. In other places common coal fires are employed. Gas is used in certain shops on the plan exhibited. The burners are arranged on the blast burner principle. The furnaces may be using gas (common illuminating) or vaporized hydrocarbons of the petroleum or gasoline class.

The object of the arrangement is to unite the blast of air and the charge of gas before the nozzle is left at point of ignition. Therefore, gases from regular gas mains, or the gases made from the oils, is carried to the common nozzle, *B*, for delivery, through the double pipe system *C* and *D* on either side. The upper pipe carries the gas and the lower the air blast. The flow of both gas and air is controlled by check valves in the pipes. Thus it is possible to get a speedy heat upon the pot by simply letting on the gas and air blast and igniting the same. The flame can be made sufficiently full and strong to almost completely envelop the lower section of the pot. In order to retain the heat, the pots are often protected with sides and top, something after the plan shown in Fig. 2. In this drawing is shown one of the furnaces in which both coal and gas are used as a means of heating the metal. The pot is marked *E*. The walls are of masonry. The cover is a plate of cast iron further protected from loss of heat by a covering of ashes, *F*. The coal ready for ignition is packed about the base. The next use of the gas in this connection is after the metal is made. Sometimes the ingredients which have been prepared in the pot are permitted to stand a little time after a thorough mixing, after which they are poured into pigs for future use. Then in other cases the metal is cast direct from the pots.

Fig. 3 is one of the types of ladles used. Fig. 4 shows one of another design. After the metal is formed into pigs by casting, we have to call upon the gas heaters again to dissolve the same for final pouring. Again the crucibles are used, the pigs are melted and all is made ready for the flow. In the pouring of the metal for the making of bearings for boxes or for kindred purposes, it is necessary to take steps to avoid an explosion from accumulated gases inside the hollow spaces. In Fig. 5 is shown a case of explosion due to pouring hot metal into a box. If there is much moisture or any liquid matter present the intense heat of the hot metal at once forms steam and gases and an explosion results. Many workmen have been injured this way. See that the bearing parts are dry; also that they are clean. Some workmen bore vents for the escape of gases. In the melting of the pigs for pouring, not infrequently the common design of brazing furnace is used. Brazing furnaces are usually worked with common house gas, although I find some patterns operated with vapors manufactured on the premises from oils. Some of these furnaces are arranged for a 4-flame charge, in which case 4 independent pipes and burners would be used. In this case there are 4 discharges of flame against the base of the pot and a quick heating occurs.



I noticed devices for generating heat from carbide apparatus for use in this line of work. The same gases were used for lighting the shops. Then there are some apparatuses in service for generating ample vapor from common illuminating oil, gasoline, etc, for producing intense flames in connection with the air blast. In one shop the device consisted in the employment of a cylinder arranged with an air pump so that air could be forced into the tank on top of the oil. This air pressure causes the vaporized oil to pass off to the delivery under pressure. The vaporizing is effected by an alcohol flame heating the pipe through which the oil under pressure passes. The air is sucked in with the flow of vapor and quite an intense flame results.

As to the casting of the metals, a mandrel like that shown in Fig. 6 is used. Two collars are required like *G G*, Fig. 7. Then the box to be poured is gotten ready. If only the interior bearing of the box is to be filled, for the purpose of making a complete fit, the plan is like that in Fig. 8, in which the box proper is marked *H*, and the method of pouring through the two oil holes by using tunnels is marked *I I*. A regular casting form is necessary when the full sleeves of a box are to be cast. After pouring the metal, the box is allowed to cool a few hours. Then the mandrel is removed and the parts smoothed and chipped to get into order.

Sometimes there is a deflection on the interior of a gas or oil engine cylinder to be attended to. In Fig. 9 is pointed out at *J* a score or groove in the cylinder. This defect may be overcome by pouring the indenture full of the babbitt metal. Then the parts are smoothed down with files and emery, and the imperfection in the cylinder is repaired.

Explosion at the Works of the Washington (D. C.) Gas Light Company.

The illustration shows the condition of the exhauster house and condensing room of the East station of the Washington (D. C.) Gas Light

Company, after the explosion that wrecked the same at an early hour of the morning of the 8th inst. No lives were lost, three persons sustained slight injuries, and the damage is estimated at $50,000.

The Use of Dissolved Acetylene.

Iron Age notes that interesting data concerning the manufacture and use of dissolved acetylene are contained in two papers presented at meetings of the past summer. One was read before the German Acetylene Association by Herr Kuchel, a director of the company which is introducing the dissolved acetylene process in Austria. The other, entitled "Compressed Acetylene," was read before the International Acetylene Association at its meeting in New York in August by Eugene Bournonville, of New York, representing the American company handling the same process. The process involves dissolving acetylene at a pressure of 10 to 12 atmospheres in acetone, which is absorbed within the pores of porous material held in steel cylinders. One volume of acetone dissolves 25 volumes of acetylene at ordinary temperatures and atmospheric pressure, the solubility increasing in proportion to the pressure, so that at a pressure of 10 atmospheres 1 volume of acetone holds 250 volumes of acetylene and at 12 atmospheres about 300 volumes of the gas. These solubility figures, however, are seriously lowered by the presence of foreign matter in the acetone, especially water; and since a cylinder containing the porous matter holding the solution is used in practice an indefinite number of times any impurities in the acetylene tend gradually to accumulate in the vessel, materially reducing its capacity in terms of gas.

The essential feature of the porous matter employed is that it shall neither attack the acetone nor the acetylene and that it shall possess, as accurately as possible, a porosity of 80 per cent.—*i. e.*, that its substance shall occupy 20 per cent. of the space which it appears to fill entirely. Two kinds of porous matter are now employed. In the United States a paste of asbestos in fine fibers and silicate of soda is molded into disks exactly fitting the interior of the cylinders, and the disks are then dried. The cylinders are made with separate ends, the disks are put in and the ends are brazed into place. In Austria and elsewhere a paste composed of charcoal and a cementitious material is prepared, run into the cylinders as a fluid and dried inside by gradually applied heat. It then solidifies into a porous mass, free from cracks or holes and exhibiting a specific gravity of 0.3.

The acetone used must be of 99 to 99.6 per cent. purity, distilling at a temperature of 56.3° C. without leaving any residue. It expands in bulk as it dissolves the gas, increasing about 4 per cent. in volume for every atmosphere of pressure, according to Herr Kuchel, so that 1 volume becomes about 1.5 volumes when fully saturated at 12 atmospheres. Mr. Bournonville makes the expansion about 35.8 per cent. for 10 atmospheres. Hence the cylinder cannot be completely filled with liquid. After 20 per cent. of the space has been filled with the porous solid, as above described, the cylinder is charged with acetone till the liquid occupies 43 per cent. of the original space, thus leaving 37 per cent. of the space available for the expansion of the solution and for the retention of some compressed gaseous acetylene.

Dissolved Acetylene for Train Lighting.—The London *Engineer* makes an addition to Herr Kuchel's table, comparing dissolved acetylene, oil gas, oil gas enriched with 25 per cent. by volume of acetylene and electricity derived from lead accumulators for the illumination of trains. The points considered are the weight, bulk and capacity in terms of burner-hours of the apparatus storing the energy. The original table has as one item the compressed oil gas of Germany, which evolves on combustion 4.77-candle power per cubic foot. As British oil gas evolves 8-candle power, the *Engineer* adds a line for that gas. The data refer to apparatus in common use in railways and are as follows: To hold 283 cubic feet of oil gas 2 cylinders are required, 22 inches in diameter, one 8 feet 3 inches and the other 9 feet 6 inches long. Together they weigh 1,150 pounds and occupy a space of 45.3 cubic feet. They are capable of supplying a flame of 16 Hefner units for 96.15 hours, so that their weight per 16 Hefner units is 12 pounds and their bulk 0.47 cubic foot. Sixteen Hefner units are approximately equal to 14 British candle power. Identical receivers to those already described are necessary to hold an equal volume of acetylene oil gas, but the compressed gas has an illuminative value of 11.8-candle power per foot—the rest of the calculations may be omitted. An electric accumulator of 32 elements, each having a capacity of 90 ampere-hours at 2 volts, held in 4 receptacles 15 × 10.6 × 12.3 inches in size, weighs 880 pounds, occupies 9 cubic feet of space and stores 5,760 watt-hours. Railway electric incandescent lamps develop 1 Hefner unit per 2.5 watts. To carry 141.5 cubic feet of dissolved acetylene 1 cylinder 3 feet 10 inches long by 9.3 inches in diameter is needed; this weighs about 181 pounds and occupies 1.77 cubic feet of space. The luminous acetylene burners used in trains develop light at the rate of 35.5-candle power per cubic foot. Thus the table below is arrived at:

Details of Apparatus per 16 Hefner Units or 14-Candle Power Flame.

	Hours of Light.	Weight in Pounds.	Space Occupied in Cubic Feet.
German oil gas, at 4.77-candle power per foot	96.15	12.0	0.47
British oil gas, at 8-candle power per foot	161.7	7.1	0.28
Electricity from accumulators	144.0	6.1	0.06
Acetylene oil gas, at 11.8-candle power per foot	238.1	4.8	0.19
Dissolved acetylene, at 35.5-candle power per foot	357.14	0.53	0.005

Comparative Costs.—Referring to the relative costs of the different illuminating agents Herr Kuchel's paper gives a detailed estimate of the cost of making dissolved acetylene. He takes a factory having a capacity of some 1,000 cubic feet of gas per day of 24 hours, which, he says, can be built for about £1,500. Allowing for interest, depreciation and sundry expenses, taking carbide of 300 liters per kilogram gas making power—which he finds under rather than over the actual figure—at 12s. 6d. per hundredweight, calculating the cost of the acetone and reckoning on the dilution of the acetylene with acetone vapor, he makes the dissolved gas cost 1.387 marks per cubic meter—*i. e.*, 1.552 pf. per hour per flame of 16 Hefner units, or 14 British candle power. Data referring to the other illuminants, in which, however, depreciation on the plant is usually omitted, are published by several Continental railways. The mean cost of oil gas for the same amount of light from the figures of the Etat line in France and the State line in Hungary is 2.548 pf. The mean cost of acetylene oil gas on the Prussian State line and the Kais, Ferdinand Nord line is 1,598 p.f, and the average cost of accumulator electricity from the returns of the Friedrich Wilhelm line in Mecklenburg, the Kais, Ferdinand line, the Eastern and the Southern lines in France and the Hungarian State Railway is 8.976 pf. per 14 British candle hours.

In his paper read at the New York convention Mr. Bournonville deals with the question of cost thus: Pintsch gas costs $5 per 1,000 feet of 9,000-candle power. A railway car equipped with 5 fixtures of 4 burners each, consuming 1 foot per hour per burner, is provided with 180-candle power of light, and the cost is 9.90 cents per hour. One short ton of carbide delivered at the works costs $70, to which $5 may be added for the expenses involved in preparing dissolved acetylene. One short ton of carbide yields 9,500 cubic feet of acetylene, which develops "50-candle power per cubic foot." Hence the production of 180-candle power of light in a railway car costs 2.84 cents per hour. He asserts that several lines in the United States have proved the maintenance of lamps, etc., to be about 35 per cent. cheaper when acetylene is employed than when Pintsch gas is used.

Pipe Line to be Built from Jennings, Westward, toward Beaumont.

The *Oil Investors' Journal* says that pipe is on the way from Youngstown, O., for the construction of a 6-inch line, to start at the Jennings, La., oil field and to extend westward, toward the Beaumont district, where all the southeast Texas pipe lines converge and lead to deep water at Port Arthur or Sabine.

The Texas Company will lay the line. President J. S. Cullinan states that the present intention is to build to Lake Charles, La., on the Calcasieu river, 35 miles west of the Jennings field and on a line between that point and the Beaumont district. The Kansas City Southern Railroad has a branch extending from De Quincy, La., to Lake Charles, and the new pipe line will give the Texas Company loading facilities on this road. At present the Southern Pacific is the only railroad that gets Jennings business. Three pipe lines, 4 or 5 miles long, convey oil from the Jennings field to different loading points on the Southern Pacific—one at Jennings, one at Mermentau and one at Egan—for shipment to consumers in carloads and in trainload lots to the pipe line companies at Beaumont and Sabine. An interstate rate of 9.7 cents a barrel is in effect on trainloads from Jennings to Beaumont, and a rate of 15 cents is in force between Jennings and Sabine, where the oil is loaded on vessels for coastwise shipment. The trainload movement has amounted to about 150,000 barrels a month this fall. The total movement over the Southern Pacific line from Jennings will average about 500,000 barrels a month this year.

The Kansas City Southern line reaches Beaumont. This means that the Kansas City Southern will be in position to get some of the trainload business. Loading facilities on this line at Lake Charles will give an advantage to shippers and consumers, both in increased facilities, which will create healthy competition, and in an extension of territory for the economical marketing and distribution of the Jennings product.

Ten miles west of Lake Charles is the plant of the Union Sulphur Company, the largest consumer of Louisiana fuel oil. It requires 2,500 barrels a day to fire this Company's boilers.

Beaumont is 60 miles west of Lake Charles. The extension of the line from Lake Charles to Beaumont would make it cross the Calcasieu and Sabine rivers. The Sabine is a navigable stream, and there would be opportunity for a considerable fuel oil business along its course.

President Cullinan does not confirm the newspaper reports to the effect that the matter of building to Beaumont has been decided.

Figures on a Municipal Lighting Plant for New York.

The Municipal Engineers of the City of New York held a meeting at the Chemists' Club, November 22. Prof. G. F. Sever read a paper or report on the proposed municipal lighting plant. This paper rehearsed the course of events since the end of 1904, and noted the formation of the commission composed of Prof. Sever and Dr. Cary T. Hutchinson to investigate the subject under the instructions of the Board of Estimate. The scheme outlined in the report is one based on alternating current supply, without the element of a storage battery as reserve or insurance against interruption. Three power plants on the water front are proposed; one for Manhattan Island, one for Brooklyn and one for Staten Island, the first two to be connected. All plants are to have turbo-generators, 3 phase, 60 cycle, 11,000 volts, with oil switches, etc. The various sub-stations are to step down the current to 2,200 volts, with distribution at 230 volts, the cables being underground.

The report includes various plans. One of these, "A," deals with the public electric lighting as it is. Under this estimate it was found that a power plant capacity of 10,000 kw. was required to supply 6,000 arc lamps and a connected load equivalent to 250,000 16-candle power incandescent lamps. The total cost of the power house, sub-stations and distributing systems was found to be $4,100,000; the cost of operation per arc lamp, $75.40; cost per incandescent lamp service per kw. hour, 5.15 cents; total cost of operation, $906,000.

The estimate includes neither the cost of construction of ducts for cables, nor rental charge for duct space, as the Corporation Counsel has informed the commission that the city has the right to use all duct space that it requires, free of charge.

Another report "B," was submitted on June 19, 1905, and contains the plans and specifications of the power stations, which are the same for Manhattan and Queens. Between the submission of report "A" and report "B," $600,000 had been appropriated for power house sites in Manhattan and Queens and the same had been purchased. This estimate which includes the lighting under "A," and in addition the replacing of all gas, naphtha and other illuminants, in the streets of Manhattan and the Bronx, by electric lights, provides for a power house of 15,000 kw. capacity and a distributing system designed to supply 15,000 arc lamps and 300,000 16-candle power incandescent equivalents, at a total cost of $7,567,000.

The total annual operating and fixed charges are $1,269,000. The proposed plant, it is claimed, would effect a saving, based on the prices in effect before the passage of the recent law reducing the price of electric power and light, of $434,000.

Another report "C," covers the Boroughs of Brooklyn and Queens on the same basis as "A" covers the Manhattan and the Bronx. It was found that a plant of 10,000 kw. capacity would be necessary and a distribution system designed to supply 7,500 arc lamps and 200,000 16-candle power equivalent incandescents, at a total cost of $6,138,000. The total operating and fixed charges would be $845,000 or $27,000 more than it would cost to obtain service for the same number of lamps from existing sources of current under the new prices.

It is claimed in this connection, however, that the service contemplated in this report is superior, both in quality (electricity being substituted for gas in all buildings) and candle power, to that now furnished the city. And also that the estimate covers the cost of a conduit system consisting of 156 miles of trench, principally located in the central part of Brooklyn, where it is desired to place no additional overhead wires. Also, that the cost of incandescent service is high, the lamps burning on an average only 200 hours, as compared to 373 in Manhattan and the Bronx.

A report, "D," includes the lighting under report "C," and in addition the replacing of all gas, naphtha and other illuminants, in the streets of Brooklyn and Queens, by electric lights, and provides for a power house of 15,000-kw. capacity and a distributing system designed to supply 15,000 arc lights and 200,600 16-candle power incandescent equivalents. The total cost will be $9,485,000. The total annual operating and fixed charges will be $1,424,000. The annual cost per arc light will be $76.89 and the cost per kw. hour for incandescent service will be 13.53 cents. Taking the exact number of buildings and streets connected on December 31, 1904, as a basis of comparison, the annual cost of the city lighting for the Boroughs of Brooklyn and Queens, from the proposed plant, would be $68,000 in excess of the cost under the rates fixed recently by the State Legislature. It should be borne in mind, Prof. Sever said, that as the territory to be lighted becomes more thickly settled, the annual cost per arc lamp and kw. hour of incandescent service will decrease.

As a summary of the above, Prof. Sever said: "It will require an investment of $10,238,000 to light the four boroughs of New York city, other than Richmond, in accordance with the conditions under reports 'A' and 'C,' and $17,052,000 to light them as outlined in reports 'B' and 'D.' There will be a saving in the cost of lighting, even under the new rates passed by the Legislature, considering reports 'A' and 'C,' of $301,000, and taking reports 'B' and 'D' of $360,000; or taking Manhattan and the Bronx alone, report 'A' will have $328,000 and report 'B' $427,600.

"A municipal lighting system for the Boroughs of Brooklyn and Queens, similar to that provided under report 'C,' will make the cost of lighting $27,000 greater than under the ruling rates. One similar to that in report 'D' will make the cost $68,000 greater than under the ruling rates."

What the Bureau of Standards Has Accomplished.

Iron Age says its readers will recall the space which some years ago it devoted to advocating the passage of a bill by Congress establishing a national bureau of standards. The act as finally passed by Congress and approved March 3, 1901, provided that the Office of Standard Weights and Measures of the Treasury Department should be thereafter known as the National Bureau of Standards. Through the aggressive policy of Dr. Samuel W. Stratton, who was selected as director by the President of the United States, an excellent site was secured and the two main buildings were nearly finished before the bureau was transferred to the Department of Commerce and Labor on July 1, 1903, by the act establishing that Department. Since then the director, with the support of the Secretary of the new Department, has been able to finish the two buildings, equip the various laboratories with apparatus and gather about him a scientific staff of some 35 members, all of whom are working enthusiastically and in harmony to attain the objects for which the bureau was established.

Such were the conditions found by the Visiting Committee, appointed in 1901 by the Secretary of the Treasury when the bureau was established, on the occasion of its recent annual visit of inspection. The members of the Committee are as follows: Dr. Ira Remsen, President of Johns Hopkins University; Dr. Henry S. Prichett, President of Massachusetts Institute of Technology; Dr. Edward S. Nichols, Professor of Physics, Cornell University; Dr. Elihu Thomson, Electrical Engineer, General Electric Company, Lynn, Mass.; Albert Ladd Colby, Consulting Engineer and Iron and Steel Metallurgist, New York. They were all present and were in session for two days, during which they listened to the report of the Director on the scientific work already completed or in progress, his plans for organization and extension of the present work of standardization and commercial testing and the pressing needs for the enlargement of the bureau. They also reviewed the bulletins and circulars of information, etc., so far printed. The committee made a thorough inspection of all the special apparatus contained in the electrical, optical, photometric, physical, chemical and mechanical laboratories, as well as the elaborate and efficient system of heating, ventilation and refrigeration, the electrical generators and storage batteries and the instrument room, where most of the special apparatus has been made. It visited also the third building, partially completed, which will be entirely devoted to the study of the properties of materials when subjected to extremely low temperature.

The reception was held in the library of the bureau on Friday evening, November 3, and on Saturday the Visiting Committee called on the Secretary of the Department to make a verbal report of its approval of the work the bureau was accomplishing, and it promised to put before him a detailed report containing the results of its inspection and recommendations.

The publications of the bureau consist of a *Bulletin*, the first issue of which appeared in November, 1904, and in which it is intended to embody the results of the investigations, researches and other work of importance to the scientific, technical and manufacturing interests of the country. It will be issued at intervals as frequently as the number of papers ready for publication may require. The schedule of fees, regulations and other matters pertaining to the testing work of the bureau are being issued in the form of circulars of information. The annual report of the director of the bureau is embodied in the annual report of the Department of Commerce and Labor.

Those members of the Visiting Committee who were particularly interested in iron, steel and allied industries found that the bureau had already made progress in the following matters:

1. The verification and comparison with the United States bench standard of the steel and other metal tapes used in engineering, surveying and manufacturing.

2. The verification of electrical standards and measuring instruments.

3. Pyrometer testing and heat measurements, including the testing of thermo-couples, pyrometer galvanometers, electrical resistance thermometers, optical pyrometers, expansion pyrometers, mercurial and other forms of thermometers and the various kinds of calorimetric apparatus.

In cases of scientific and technical interest special investigations in heat measurements and allied subjects will be carried out, such as the determination of coefficients of expansion at high temperatures, specific heats, boiling points, melting points of metals, alloys, etc.

Persons desiring to become familiar with the use of pyrometers or the particular kind best suited to their requirements are welcome to visit the laboratories of the bureau, where many of the leading types of pyrometers may be seen in operation.

4. The bureau will also receive for test and correction certain kinds of glass volumetric apparatus, such as flashes, pipettes, burettes, etc. A special circular describes the kinds of apparatus which will be received for test and methods used in testing.

In all the above cases certificates are furnished bearing the date, the seal of the bureau and the signature of the director. All of the fees are very reasonable, and in some cases absurdly small, considering the time and care necessary to insure the accuracy in standardizing attained by the careful manipulation of the delicate apparatus employed.

As one of the functions of the bureau is the custody of the standard weights it has taken the initiative in endeavoring to bring about uniformity in State laws and practices in regard to commercial weights and measures throughout the country.

A meeting of the sealers of weights and measures of the various States was held at the bureau last January and resulted in arrangements for annual meetings of the State officials of weights and measures in future. In this connection the bureau has published an interesting circular showing the present wide variations in the weights in pounds per bushel legally established for various products by the several States and (for customs purposes) by Congress.

It has also published, in a quarto pamphlet of 38 pages, a valuable set of tables of equivalents of the customary and metric weights and measures.

It is the desire of the bureau to co-operate with manufacturers, scientists and others in bringing about more satisfactory conditions relative to weights and measures in the broader meaning of these terms and to place at the disposal of those interested such information relative to these subjects as may be in its possession. It is also its desire to aid in the solution of specific scientific problems arising in technical or scientific work coming within the scope of the bureau.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. RALPH WOODWARD, General Manager of the Pittsfield (Mass.) Coal Gas Company, has been granted a protracted leave of absence. In company with his family he sailed for Jamaica, West Indies, last Wednesday.

MR. J. M. S. WARING, of Chicago, delivered a most interesting lecture on "Storage Battery Engineering," at a session of the senior electrical engineers, University of Minnesota, the 5th inst. The lecturer outlined the chief uses of the storage battery, discussed the methods of operation, considered "boosting" in many phases, and the advantages of the battery as a central station auxiliary. As a concrete example of storage battery engineering, Mr. Waring debated the reasons for the adoption of storage batteries by the elevated railway companies of Chicago, and followed out in some detail the method of determining the location and practice of handling the same.

ABOUT as clever an organization of Gas Appliance Worker's Associations (for that is its exact title) is that connected with the Hartford City Gas Light Company, of Hartford, Conn. The last regular meeting of the Association was held the first week in December, and the guest of the evening was J. F. Kelly, of the New York City Welsbach division. He made a great hit, for "Brother Kell," is a great story teller.

"R. W. P.," writing from St. Louis, Mo., under date of the 10th inst., incloses the following: "The Engineers' Club, of this city, spent yesterday afternoon inspecting the properties of the Laclede Gas Light Company. The members were guests of the Company, and were much interested in the system of high pressure mains being laid throughout

the city. The members met at the 'booster' station of the Company, Broadway and Gasconade street. There the largest gas engine in the city, a machine capable of developing 300-horse power, was examined. This plant was installed by the Company a year ago, at a cost of $500,000. The party was next taken in private cars to the two plants where gas is manufactured. At all of the large plants of the Company individual lockers are provided for the employees, and the privilege of taking shower baths in modern and commodious bathrooms is afforded. On the return trip, as liquid and other refreshments were being enjoyed by the guests, Mr. C. L. Holman, the Secretary of the Company, made a short address, in which he outlined the work which had been, and is being, done by the Company. Among the engineers who made the trip were the following: S. B. Fisher, J. T. Dodds, Hans Taensfeldt, S. W. Ferdar, E. R. Fish, G. H. Elvis, H. H. Wheeler, A. P. Greensfelder, F. Theo. Adler, T. E. Bausch, W. A. Baehr, J. B. von Maur, F. H. Montgomery, A. Blassey, C. L. Holman, William Wise, W. A. Alexander, O. W. Childs, Richard McCulloch, Edward Flad, W. A. Layman, L. A. Day, Walter O'Brien, William H. Bryan, C. F. Mueller, B. W. Colman, E. E. Wall, S. Liepp and S. D. Russell."

AT the December meeting of the Board of Directors of the Columbus (O.) Gas Light and Heating Company a semi-annual dividend of 3 per cent. on its preferred stock of $3,000,000 was declared. It is payable the 15th prox., to shareholders of record, December 31st. Provision also was made for the payment of $37,500 to the Columbus Gas Company for account of interest coupons due January 1 on the issue of $1,500,000 of bonds on the artificial gas division of its property. The interest question will now rest until the annual meeting of the stockholders in April, when the Directors will pass the entire matter up to them with a statement of the conditions surrounding these bonds.

MR. W. F. CLAUSEN is now comfortably settled in Bloomington, Ills., where he is in charge of the gas plant. His record at Portsmouth, O., was a good one.

MR. F. A. NASH, President of the Citizens Gas and Electric Company, of Council Bluffs, Ia., is authority for the statement that a sum not less than $50,000 will be expended next year in bettering the works and main systems. Perhaps the greater allotment will go to the account of main extensions and replacements.

MESSRS. BARTLETT, HAYWARD & Co., of Baltimore, have been awarded a contract for the construction of a storage holder for the Brooklyn Borough Gas Company, which serves the residents of Coney Island, N. Y. The capacity of the holder will be 750,000 cubic feet.

IT is settled that the merging of the California Gas and Electric Corporation (outstanding capital stock, $10,000,000) and of the San Francisco Gas and Electric Company (outstanding capital stock, $15,848,433) has been effected. The agent in the transaction, according to the New York *Commercial*, was Mr. N. W. Halsey, of N. W. Halsey & Co., of this city. The succeeding Company is to be known as the Pacific Gas and Electric Company.

THE Cooperstown (N. Y.) Gas Company has opened up an appliance showroom, in the Strachan block. Quite a snug shop it is, too.

A PROPOSITION for a franchise for the operation of a gas plant in Dayton, Wash., is being considered by the City Council. Mr. Levi J. Davis, of Portland, Ore., seems the main party in interest.

THE authorities of Huntingdon, Pa., have entered into a contract with the Huntingdon Gas Company, for the public lighting of that place for a term of 6 years, from July 1st, 1906. The contract calls for 60 arc lamps, 2,000-candle power nominal type, on an all night and every night table, at the rate of $41.55 per lamps per annum.

IT is among the possibilities that in the near future manufacturing concerns of Albany, N. Y., will know a new factory that will replace an old one. This we infer because the firm of Messrs. D. McDonald & Co., have recently taken title to a good plot of land on Broadway near Bridge street. The present site on Lancaster street has so greatly increased in value that it would hardly pay to keep it up much longer as a factory site. If the concern does in time put up a new home, let us hope it will have as good fortune in the new as it had and has in the old.

ACCORDING to press summaries the New York State Gas and Electric Commission has assented to the petition of the proprietors of the Consumers' Light and Power Company, of Middletown, N. Y., to transfer their plant to the Orange County Lighting Company, free and clear, for the sum of $43,000. It is also in the bond that the price of gas shall not be changed for a term of 5 years, save through the voluntary act of the Company.

THERE is a disgruntled bookkeeper in Detroit named John Kellogg who is now keeping books in the West Side Brewery, that city. He was formerly in a position of trust with the Detroit Gas Company. His work towards the termination of his relations with the latter was such that his resignation was asked for. He is now posing as a reformer, by having informed the city authorities that the Detroit Company computes its output on the basis of all discounted bills instead of the basis of the original meter readings. This computation it is said will affect the price of gas in Detroit under the Company's franchise agreement with the authorities to reduce the selling rate, successively as the output increases, under named figures.

WITH great regret we record the death of Mr. Albert H. Branch, whose former good work in connection with the Denver (Col.) Gas and Electric Company will be well in the memory of most gas men. His death occurred in Denver, Col., the afternoon of the 6th inst. The correspondent to whom we are indebted for this mention, says: "Mr. Branch was a 32nd degree Mason, a Past Grand Master of the Grand Lodge of Colorado, and at one time held the position of Chief Post Office Inspector of the Western division, with headquarters in Denver. His death came as a great shock to his friends and his wife, who was with him at the time of his death. He was attacked by a congestive chill Monday night and was forced to go to bed immediately after this. He was born in Orwell, Vt., and came to Colorado in the early days. He went directly to Leadville, in 1878, when that camp was booming, and became a deputy sheriff. While serving in this capacity he met Governor Grant, and when the latter became chief executive of the State he was made private Secretary to the Governor. After leaving this position he was given a place in the Grant smelter works and became connected with Dennis Sullivan. In 1884 Mr. Branch became Chief Post Office Inspector. In 1892 he became connected with the Denver Gas Company as Manager, remaining as such until 1901, when he went to Texas, where he became interested in the Beaumont oil wells. One of the biggest gushers on the grounds was struck by Mr. Branch. From Texas he went to Oklahoma City, where he reorganized and rebuilt the old gas and electric plant of that city. This was 2 years ago and last year the deceased sold his interest therein and returned to Denver."

THE Brookfield Gas Electric and Heating Company, of Brookfield, Mo., has purchased the properties of the Elreno Gas Company, and that of the Union Light and Power Company as well. The following are the Directors and incorporators of the new Company: Milo D. Campbell and M. G. Clark, of Coldwater, Mich.; H T. Harvey, Battle Creek, Mich.; H. H. Stephens, Brookfield, Mo.; and George J. Hickox and F. N. Howell, Elreno, Okla.; President, Milo D. Campbell; Secretary and Treasurer, H. T. Harvey; General Manager, H. H. Stephens.

MESSRS. H. B. HURD and R. C. Dawes, of Chicago, have secured control of the Waterloo and Cedar Falls (Ia.) Gas Company.

MR. A. J. WHITE, the contracting agent for the Orange (Mass.) Gas Company, says that the plant will be in complete working order by July 1st.

MR. OLAF N. GULDLIN, President of the Western Gas Construction Company, of Fort Wayne, Ind., is thinking of a trip to the West Indies.

THE materials for the construction of the new storage holder (it will be up to retaining 200,000 cubic feet) for the Company at Vancouver, B. C., are on the ground. It will be put together by the John Coates Company, Whessoe Foundry, Downington, England, who also shipped the materials, via the Suez Canal route.

THE residents of Georgetown, D. C., have petitioned the authorities (in this case the authorities are the Senate and the House) for an order reducing the selling rate charged by the Georgetown Gas Light Company. The sponsor for the measure in the House will be Mr. Wm. R. Hearst, who was not chosen Mayor of New York at the election held here last month.

THE AMERICAN GAS LIGHT JOURNAL

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NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, DECEMBER 18, 1905.

The Market for Gas Securities.

The situation concerning local gas shares is very much better this week than last, Consolidated having gone something over 183, the closing price to-day (Friday) being 181½ to 182½.

Brooklyn Union is 180 to 190 nominally. It is likely that investors are becoming wise to the fact that the State Commission is not disposed to deal unjustly with the great public interests that it has been directed to overlook.

The Surburban end of the gas business is growing amazingly, and perhaps about as signal an advance as any other in that regard is the appreciation of the trading of the Brooklyn Borough Gas Company, which, although rated as a summer affair, in that it supplies the Coney Island district, is really showing over 30 per cent. gains on its winter business.

Peoples, of Chicago is 108 to 108¼ and Washington (D.C.) gas virtually at the 300 mark.

Bay State gas is ¼ bid, Mr. Lawson's contribution of cash to its coffers not having made much sensible addition to the shareholders' assets.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

DECEMBER 18.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	181⅛	182⅛
Central Union, Bonds, 5's	3,000,000	1,000	108	110
Equitable Bonds, 6's	1,000,000	1,000	..	105
" 1st Con. 5's	2,300,000	1 000	118	120
Mutual	3,500,000	100	275	290
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co. .. Bonds, 5's	11,000,000	1,000	111	114
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	..	98	104
Northern Union, Bonds, 5's	1,250,000	1,000	105	107
New York and East River .. Bonds 1st 5's	3,500,000	1,000	112	114
" 1st Con. 5's	1,500,000	..	106⅛	108⅛
Standard	5,000,000	100	140	160
Preferred	5,000,000	100	155	175
Bonds, 1st Mortgage, 5's	1,500,000	1,000	111	114
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	180	190
" " Bonds (5's)	15 000,000	1,000	113	115
Bay State	50,000,000	50	⅜	..
" ncome Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	..	65
" 1st Mtg. 5's	509,000	1,000	95	100
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000.000	1.000	47¼	50
Buffalo City Gas Co.	5,500,000	100	10	12
" " Bonds, 5's	5,250,000	1,000	75	80
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas and Electric Co	29,500,000	100	105	105¼
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	90	..
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	..	95
Preferred	3,026,500	100	107¼	108
Consumers, Toronto	,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	85½	87
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	..	..	100
Detroit City Gas Co	4,835,500	50	..	50
" Prior Lien 5's	5,503,000	1,000	..	98
Detroit Gas Co., 5's	381,000	1,000	75	80
" Inc. 5's	16,000	100	98⅛	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104¼	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	110	112
" Bonds, 5's	10,500,000	..	110	110⅜
Indianapolis	2,000,000	..	60	70
" Bonds, 5's	3,650,000	..	104¼	105
Jackson Gas Co.	250,000	50	82	..
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	.	
Preferred	2,500,000	100	..	105
Bonds	10,000,000	1,000	108¼	109
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1 000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas & Elec. Co. " 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	85	87
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	4,600,000	..	137	138
New Haven	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	108⅛	108¼
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	.
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	104¼	105¼
San Francisco, Cal.	15,800,000	100	58¼	58¾
St. Joseph Gas Co. " 1st Mtg. 5's	751,000	1,000	92	..
St. Paul Gas Light Co	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112⅜	115
General Mortgage, 5's	2,465,000	1,000	96¾	..
Syracuse, N. Y.	1,975,000	100	50	55
Bonds	2,047 000	1,000	102	..
Washington, D. C	2,600,000	20	298⅛	299⅜
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del	600.000	50	230	.

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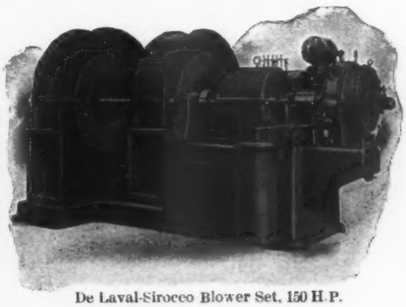

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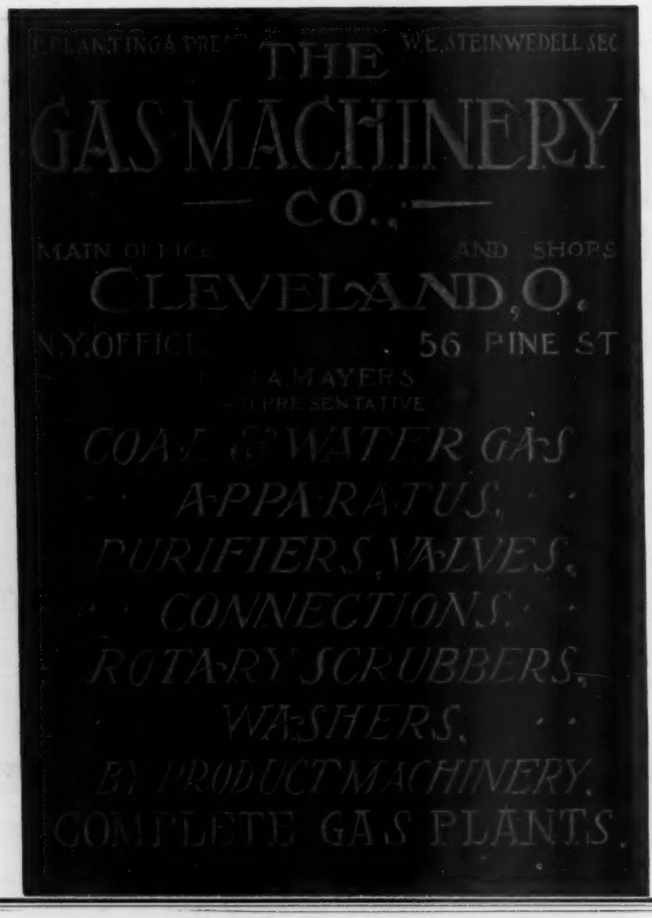

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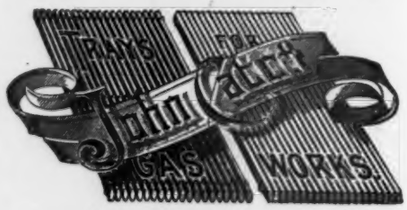

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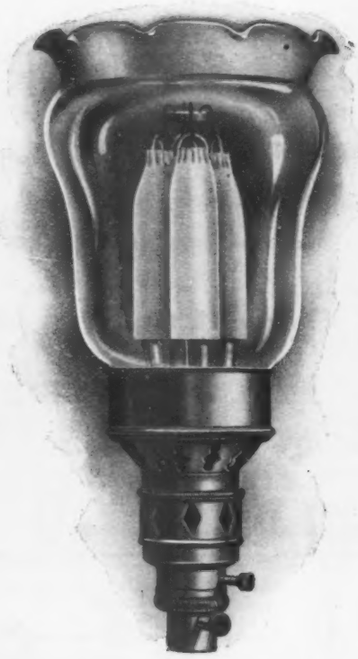


MARTIN MULTIPLE BURNER.

A WORD TO THE GAS PRODUCER.

EVERY producer wants his goods to show at their best.

Every gas producer wants his gas to give the best possible light—therefore he endeavors to produce the best possible gas.

But the quality of the light isn't solely a question of the gas. The gas must be right, of course, but the burner must also be right. There's the rub. How often is good gas wasted on inferior burners?

A burner which will give the maximum of efficiency is as important in the business of a gas company as the quality of the gas itself.

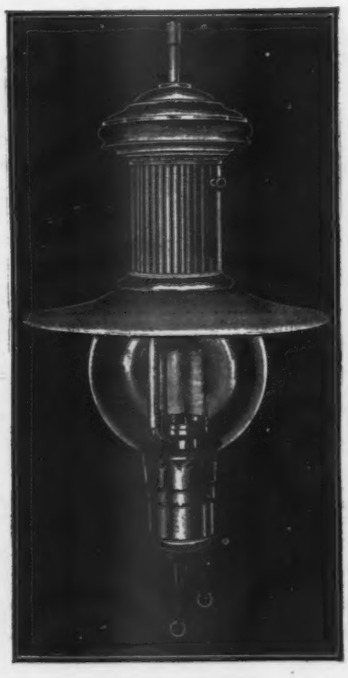
The MARTIN MULTIPLE BURNER

DOORENBOS ARC No. 1.
BEST IN THE WORLD.

solves the problem of burner efficiency. It's an open Bunsen, with no screens or caps to cause resistance, and it has four small mantles, which give the largest possible incandescent lighting surface on a minimum gas consumption. These are the main points, but the sum of them all is this—

We guarantee more light per cubic foot of gas consumed than any other burner made.

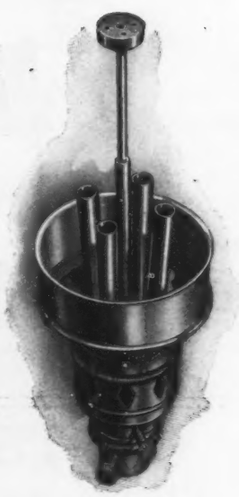
It has perfect control of both gas and air, can be instantly regulated to any gas, can be used on any gas fixture, has a standard fitter, and carries any glassware.



DOORENBOS OUTSIDE ARC.
BEST IN THE WORLD.

The DOORENBOS GAS ARCS

are used exclusively by over 300 gas companies in the U. S. If you are not one of them and are having any trouble with the arcs you are using, we guarantee to stop that trouble with the use of the Doorenbos. It won't cost you anything to give this a trial. Put the responsibility on us. Write to-day for our plan.



MARTIN MULTIPLE BURNER.
NO CAPS OR SCREENS.

J. H. T. Martin Company,

INCORPORATED.

GENERAL OFFICES:

198 WEST BROADWAY,
NEW YORK.

PARKER-RUSSELL MINING AND MFG. CO.,

OF ST. LOUIS, MO.,

PROPRIETORS OF THE

OAK HILL GAS RETORT AND FIREBRICK WORKS.

ST. LOUIS OFFICE: 417 Pine Street. NEW YORK OFFICE: Aldrich Court, 45 Broadway.

WE MAKE A SPECIALTY OF WATER GAS LININGS AND CHECKER BRICK.

Half and Full Depth Benches of Our Own Design, Containing 6, 8 or 9 Retorts.

SLOPERS.—We have perfected plans of INCLINED RETORT BENCHES, designed to meet conditions prevailing in America, and constructed entirely of American materials.

We Build Benches Complete. Ready for Gas Making. Also,

RETORT HOUSES,

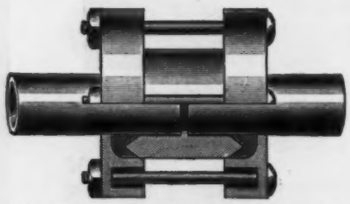
COAL and COKE CONVEYING MACHINERY.

Plans, Specifications and Estimates Cheerfully Furnished.

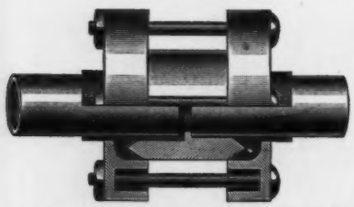
CORRESPONDENCE SOLICITED.

ALL CONTRACTS MADE AS OF ST. LOUIS, MO.

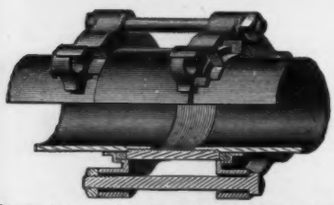
Gold Medals awarded by the Louisiana Purchase Exposition at St. Louis, for fireclay gas retorts, gas retort benches, firebrick and setting tiles.



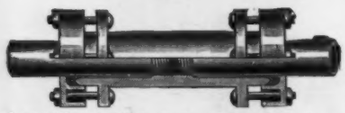
Regular Coupling, Style 1, for Plain End Wrought Iron Pipe.



Insulating Coupling, Style 5, for Plain End Wrought Iron Pipe,



Clamp, Style 4, for Repairing Leaks on Screw Collar.



Long Sleeve, Style 2, for Mending Broken Lines.

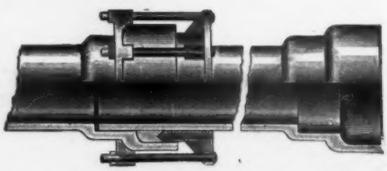
S. R. DRESSER,

BRADFORD, PA., U. S. A.,

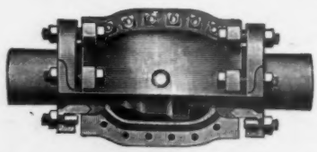
Patentee and Manufacturer of Specialties for Gas and Water Lines,

Pipe Couplings, Sleeves, Clamps, Crosses, Tees and Ells.

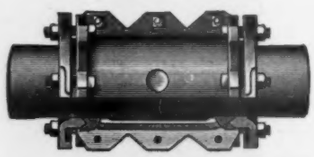
STATE REQUIREMENTS AND SEND FOR CATALOGUE.



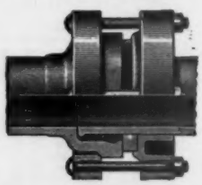
Coupling, Style 9, for Special Style Cast Iron Pipe.



Split Sleeve for Repairing Broken Bell on Cast Iron Pipe.



Split Sleeve for Repairing Broken or Cracked Cast Iron Pipe.



Clamp, Style 4½, for Repairing Leaky Lead or Cement Joints in Cast Iron Pipe.

STEWARD'S EASTERN DEPOT.

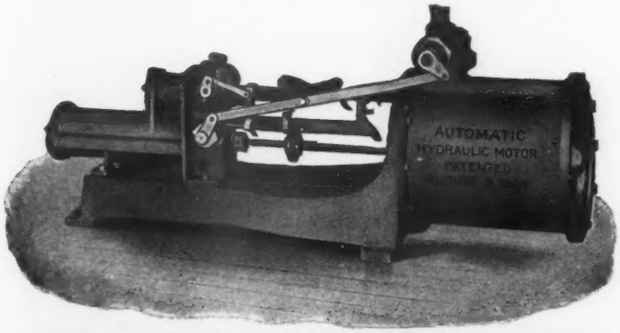
For the convenience of Eastern gas companies and dealers we now have a full stock of Steward Burners and Lava Gas Tips in New York city. Your orders will be filled promptly.

D. M. STEWARD MFG. CO., Established 1876,

CHATTANOOGA, TENN.

47 Murray Street, New York.
Fensterer & Ruhe, Agents.

THE AUTOMATIC HYDRAULIC MOTOR



will more than double the candle power of the ordinary mantle light. Get particulars. Leased to consumers through gas companies only. An interesting and liberal proposition will be submitted to gas companies for the asking.

HYDRAULIC MOTOR SERVICE COMPANY, 14 & 16 Park Place, New York.

THE AMERICAN STANDARD COMPOSITION CO.

—) MANUFACTURES (—

HEAT PROOF AND DAMP PROOF PAINTS

For Structural Iron and Steel, Gas Apparatus, Underground Piping, Boiler Fronts, Stacks, etc.

Our Paints will not crack, peel or scale. Heat does not affect them. They are moisture proof.

They are the Paints that Don't Come Off!

We let you Try before you Buy. Send for samples and prices.

AMERICAN STANDARD COMPOSITION COMPANY,

1707, Wall Street Exchange Building, New York.

HUMPHREY OVAL GAS HEATERS,

THE FINEST COMBINED GAS HEATERS AND GAS HOT PLATE IN THE WORLD. THOROUGHLY PRACTICAL.

Heat with the whole of it.

COMPLETE SECTIONAL VIEW.

Cook with the half of it.

OPERATION.

The coldest air lies next to the floor always. The Humphrey Oval (see illustration) takes the cold air from the floor, heats it hot and forces it out at the side. Other stoves allow this heat to rise directly to the ceiling without being diffused through the room, thus taking a long time to heat the room, wasting time and fuel.

Height, 16 inches. Weight, 4¼ pounds

Price, polished nickel, per dozen....$24

Not sold in less than dozen lots.

Liberal Discounts and Prompt Shipments. :: :: :: ::

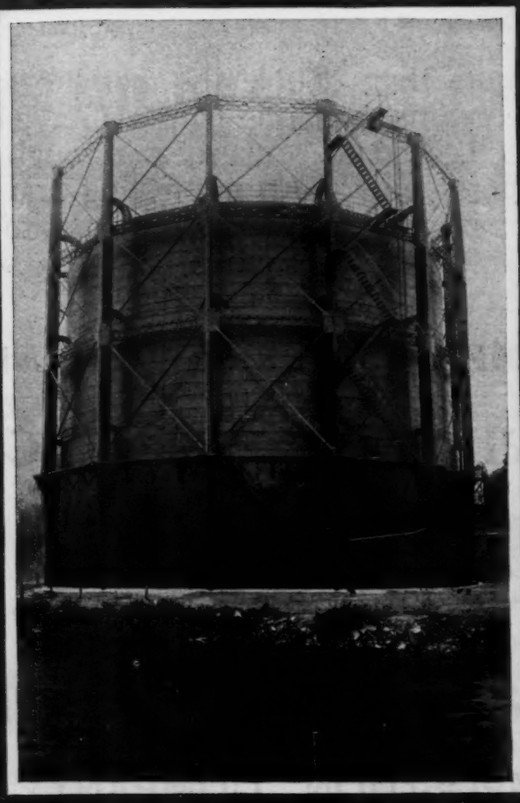
Why not send us an order to-day for your season's requirements?

For every hot water need, use a Humphrey Crescent Instantaneous or an Automatic Water Heater. :: ::

Divides in the middle. No nuts, bolts or screws.

When not in use, or to pack, pull the legs out, untwist the burner and pull it out, tuck one-half of the jacket inside the other and lay the legs and burner in the bowl. A child can do it, and, when done, it occupies a very small space.

HUMPHREY CO., Kalamazoo, Mich., U. S. A.



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PHILADELPHIA OFFICES
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WORKS
Ambler, Pa

Manufacturers of

TRIPLE
DOUBLE and
SINGLE-LIFT

Gas Holders

WITH OR WITHOUT
METAL TANKS

Oil and Water Tanks
Purifier Covers
General Plate Metal Work and
Steel Water Towers

PLANS, SPECIFICATIONS AND ESTIMATES
PROMPTLY FURNISHED ON REQUEST

WHY DO GAS EXHAUSTERS

AND HIGH PRESSURE GAS PUMPS BUILT BY

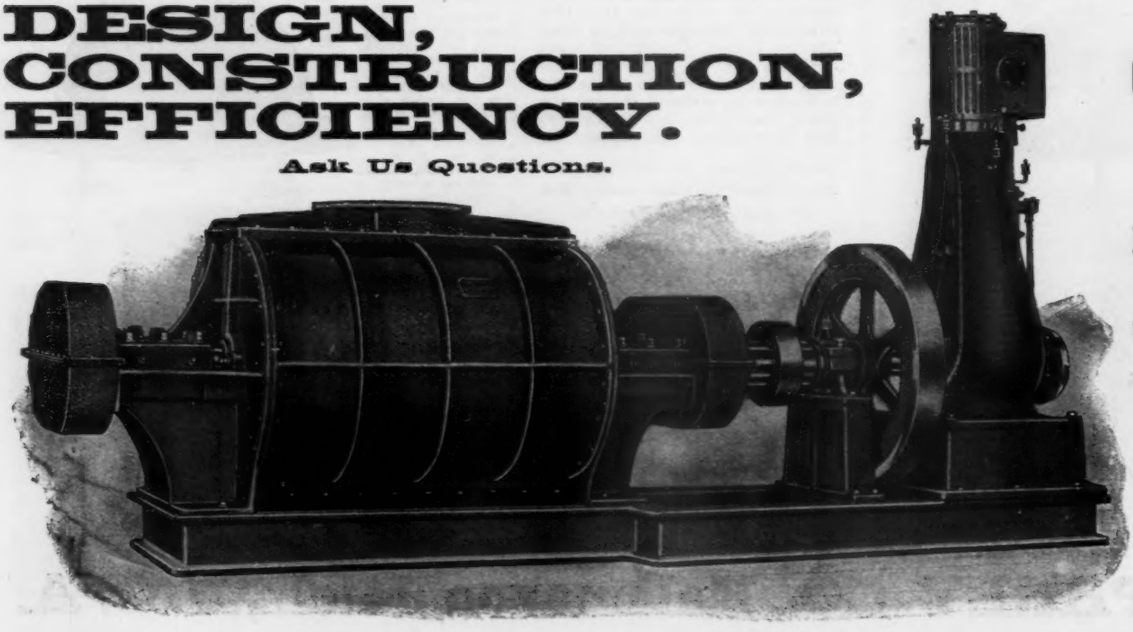
THE CONNERSVILLE BLOWER CO.

Stand so High in the estimation of those using them?

THE ANSWER IS IN THREE WORDS:

DESIGN, CONSTRUCTION, EFFICIENCY.

Ask Us Questions.



Home Office:
CONNERSVILLE, IND.

Eastern Sales Agent:
HORACE G. COOKE,
95 Liberty Street,
New York City.

Write us about our Improved Stuffing Boxes.

Something Entirely New.

BRAY BURNERS

Have been Used for Forty Years by the Leading Gas Companies.

Cheaply gotten up and inferior imitations of the BRAY are constantly coming in and going out of use. We respectfully warn Gas Companies against the use of these infringing burners. What you may save in cost is more than lost in dissatisfaction to your consumer as well as to yourself. See that such burners as you use are STAMPED WITH BRAY'S NAME and MARKED "PATENTED." This is a guarantee against imitation and an insurance of a perfect burner.

Write us to-day for our Bray Blue Book. We will gladly send you same upon application.

W. M. CRANE COMPANY,

1131-1133 Broadway, New York, N. Y.,

We make Gas Appliances of all kinds. Sole Agents for the U. S.

THE

Ludlow Valve Mfg. Co.,

TROY, N. Y., U. S. A.

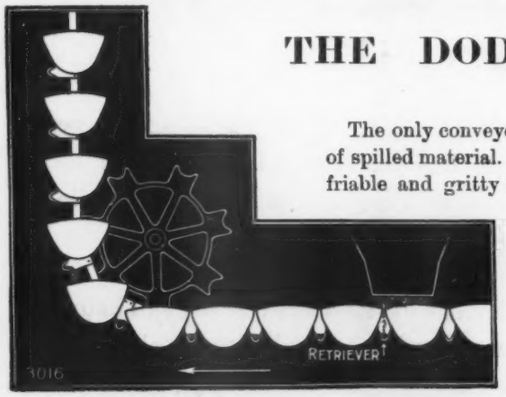
Double and Single **Gate Valves**, ¾" to 72",

—FOR—

Gas, Water, Steam, Oil, Ammonia, Etc.

HOT GAS VALVES A SPECIALTY.

Send for Catalogue.



THE DODGE CONVEYOR

(PATENTED).

The only conveyor that prevents the accumulation of spilled material. Handling coal, ashes and other friable and gritty materials. Write for particulars.

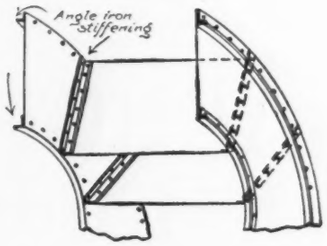
THE LINK-BELT ENGINEERING COMPANY,

PHILADELPHIA.

NEW YORK: 49 Dey St. PITTSBURGH: Park Building.

CHICAGO: The Link-Belt Machinery Co.

Another Point of Interest to Fan Users.....



In a recent advertisement we explained how our Fans were made more rigid and truer running than others (resulting in less back blowing) by the use of angle iron stiffening rings on the inner and outer edges of the side plates We now wish to direct your attention to the short pieces of angle iron used to attach the floats to the side plates. Other makers simply turn up the edge of the sheet steel float, greatly weakening the metal at the bend and making a very poor construction. Our attachment is rigid and sure. It costs us more, but it makes a better fan, and that is just what we profess and purpose to make. We believe that the engineers and owners of high-class plants want reliable and workmanlike construction and will recognize it.

Send for our Booklet on FANS, BLOWERS and EXHAUSTERS, and, if you do not already have a copy, ask also for our book on Fuel Economy.

THE GREEN FUEL ECONOMIZER CO.,

Matteawan, New York.

(Sole Makers of Green Fuel Economizers in the United States.)

EMPIRE GAS IMPROVEMENT AND CONSTRUCTION CO.

This Company has purchased the patents and goodwill in the business hitherto carried on and owned by *A. M. Sutherland.* It is now ready to contract for the erection and installation of

ENTIRE GAS WORKS,

or any separate portion of the same, such as **Gasholders, Coal Gas Benches, Lowe-Sutherland** double-superheater **Water Gas Sets,** Scrubbers, Condensers, Exhausters, Purifying Boxes, Street Governors, Street Mains and Main Laying.

The high character of the work done by A. M. Sutherland during the past 15 years will be strictly adhered to and all work is warranted.

Mr. Sutherland remains with the Company for two years President and Director, and will give personal attention to contracts.

EMPIRE GAS IMPROVEMENT AND CONSTRUCTION CO., 49 Wall St., New York.

LLOYD CONSTRUCTION COMPANY,

DETROIT, MICH.,

Designers and Builders of Gas Works Apparatus.

Western Agents
BARTLETT, HAYWARD & CO., Baltimore, Md.

MUELLER PIPE REAMERS.

RATCHET HANDLE PATTERN.

C—035.

For a pipe reamer to do smooth work, the blades should be kept working on the same line they start with; this can't be accomplished with some reamers because each reverse handle movement changes the position of the blades in the pipe.

In Mueller Ratchet Handle Pipe Reamers the ratchet feature permits the handle movement to be reversed without changing the position of the blades, and the next forward motion of the handle forces the blades along the same line they were on at first. They make a continuous smooth cut.

Mueller Pipe Reamers have the blades well relieved, are made in plain handle and ratchet handle patterns, and ream all sizes of pipe up to 3-inch.

Each reamer is carefully inspected and assembled, is given an actual working test, bears the Mueller trade mark, and is *unconditionally guaranteed.*

We also make tapping machines, meter connections and gas cocks for gas works' use Catalogs upon request.

H. MUELLER MFG. CO.

Works and General Offices
DECATUR, ILL., U. S. A.
West Cerro Gordo St.

Eastern Division
NEW YORK, N. Y., U. S. A.
254-258 Canal St. (Cor. Elm)

ROOTS' GAS EXHAUSTERS.

GOLD MEDAL AT ST. LOUIS, 1904.

Installation showing our latest improved machines, with flexible rope coupling, for large units.

SEND FOR CATALOGUE.

HOME OFFICE:
Connersville, Ind.

NEW YORK OFFICE:
120-122 Liberty St.

CHICAGO OFFICE:
1547 Marquette Building.

PRACTICAL PHOTOMETRY,

A GUIDE TO THE STUDY OF THE MEASUREMENT OF LIGHT.

By WILLIAM JOSEPH DIBDIN.

With Numerous Illustrations. Price, $3.00.

A. M. CALLENDER & CO., No. 42 Pine Street, New York City.

THE GAS ENGINEER'S POCKET-BOOK,

By HENRY O'CONNOR,

Comprising Tables, Notes and Memoranda relating to the Manufacture, Distribution and Use of Coal Gas, and the Construction of Gas Works.

PRICE, $3.50.

FOR SALE BY

A. M. CALLENDER & CO., - No. 42 Pine Street, New York City.

GEORGE ORMROD, Mangr. & Treas., Emaus, Pa.
JOHN DONALDSON, Prest., Betz Bldg., Phila., Pa.

EMAUS PIPE FOUNDRY.

DONALDSON IRON COMPANY. EMAUS, PA.

MANUFACTURERS OF

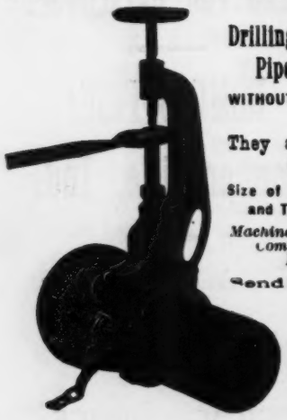
CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

GAS TAPPING MACHINES

—FOR—



Drilling and Tapping Pipe under Pressure

WITHOUT ANY ESCAPE OF GAS.

They are Strong and Compact.

Size of Combination Drills and Taps ¾ to 4-inch.

Machines Sent to any Gas Company for Thirty Days' Trial.

Send for Circulars.

Geo. Light,
DAYTON, O.

MUELLER
DRY PIPE TAPPING MACHINE.

C—1008.

Mueller Dry Pipe Tapping Machines, including the Mueller "Regular," "Our Special" and "Our Special No. 2," comprise a line unequal for their class of work. They are made strong, are easily attached to the pipe, and are easy to operate under all conditions of use. All dry pipe machines make taps from ⅝ to 3-inch in any size of pipe. Unconditionally guaranteed. Catalogues upon application.

H. MUELLER MFG. CO.,
Decatur, Ill., U. S. A. New York, N. Y., U. S. A.

"THE MINER"
Globe Street and Boulevard Lamps.
Cheapest and Best
THOUSANDS IN USE WITH INCANDESCENT BURNERS.
Send for Catalogues.
THOMAS T. W. MINER,
821-823 Eagle Av., N.Y.

GASHOLDER TANKS AND GAS WORKS MASONRY COMPLETE.

Plans prepared and Estimates furnished at short notice.

J. P. WHITTIER,
238 Java Street, Brooklyn, N. Y.

WARREN FOUNDRY AND MACHINE CO.,

Established 1856. Works at Phillipsburgh, N. J.

New York Office, 160 Broadway.

CAST IRON WATER AND GAS PIPE,

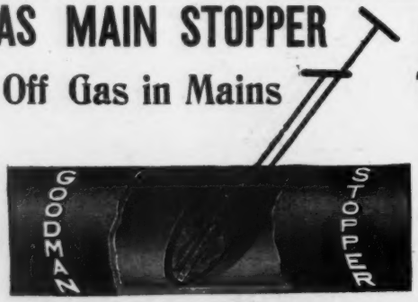
FROM THREE TO FORTY-EIGHT INCHES DIAMETER. ALSO, ALL SIZES OF

Flange Pipe for Sugar House and Mine Work. Branches, Bends, Retorts, etc., etc.

SAFETY GAS MAIN STOPPER COMPANY,

For Shutting Off Gas in Mains

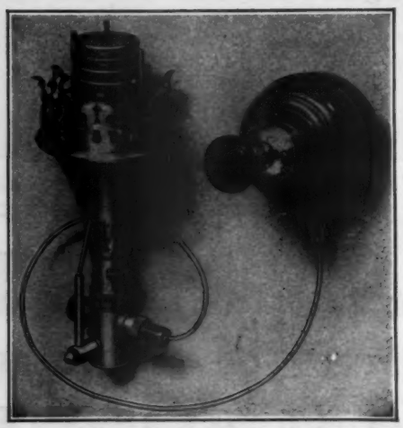
Any size gas main can be shut off in 30 seconds. : : :



Temporarily during alterations and repairs. : : : :

STOPPERS SENT ON TRIAL.

Address: SAFETY GAS MAIN STOPPER CO., 1668 Park Ave., New York City.



OUR

PNEUMATIC GAS LIGHTER

BEATS

ELECTRICITY in CONVENIENCE,

MAKES

INCANDESCENT GAS LIGHTING

PERFECT.

YOU ARE an up-to-date gas company or dealer, and should write for our CATALOGUE to-day. :: ::

PNEUMATIC GAS LIGHTING CO.,
150 NASSAU ST., NEW YORK.

Chollar's System of Gas Purification.

THE PURIFIED GAS REVIVES THE FOULED OXIDE.

Four Roll Troughing Idler
FOR WIDE BELTS.
The positions of the rolls conform to a natural and uniform curve of the belt.

BELT CONVEYORS

EQUIPPED WITH

BALL BEARING ROLLS

Possess greater efficiency, consume less power, and the belts last much longer than when any other type of roll is employed.

Permit us to tell you why and to submit plans and estimates.

The Link-Belt Machinery Co.
Link-Belt Engineering Co. Philadelphia Chicago U.S.A.

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

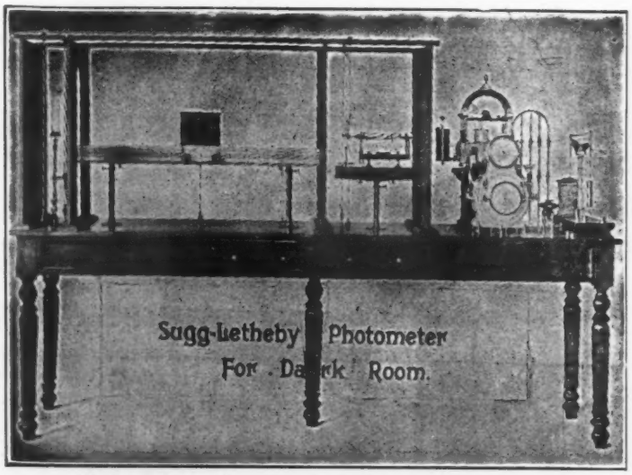
JANUARY, 1906.

Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.
Mon.	1	10.40 PM	6.20 AM
Tue.	2	11.40 FQ	6.20
Wed.	3	12.40 AM	6.20
Thu.	4	1 30	6 20
Fri.	5	2.30	6.20
Sat	6	3.20	6.20
Sun.	7	4.20	6.20
Mon.	8	5.10	6.20
Tue.	9	No L.	No L.
Wed.	10	No L. FM	No L.
Thu.	11	No L.	No L.
Fri.	12	5.20 PM	8.10 PM
Sat.	13	5.20	9.10
Sun	14	5.20	10.20
Mon.	15	5.30	11.30
Tue.	16	5.30	12.40 AM
Wed.	17	5.30 LQ	1.40
Thu.	18	5.30	2.50
Fri.	19	5.30	4.00
Sat.	20	5.30	5.10
Sun.	21	5.40	6.20
Mon.	22	5.40	6.20
Tue.	23	5.40	6.20
Wed.	24	5.40 NM	6.20
Thu.	25	5.40	6.20
Fri.	26	5.40	6.20
Sat.	27	5.40	6.20
Sun.	28	5.40	6.10
Mon.	29	9.30	6.10
Tue.	30	10.20	6.10
Wed.	31	11.20	6.10

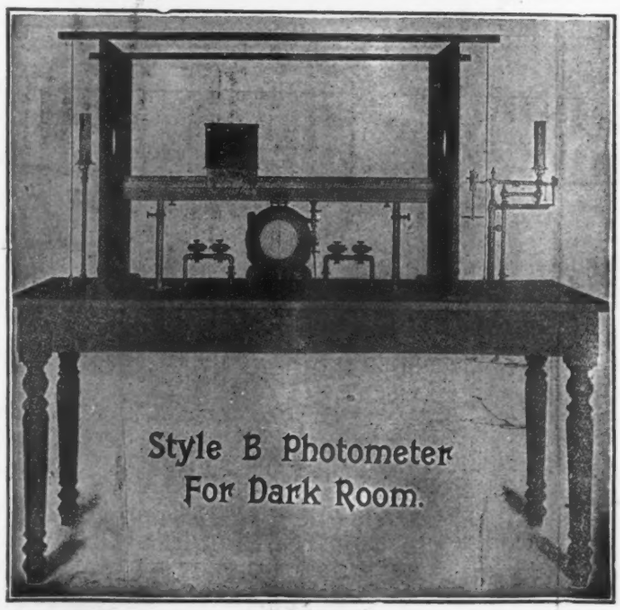
TOTAL HOURS DURING 1906.

By Table No. 1.

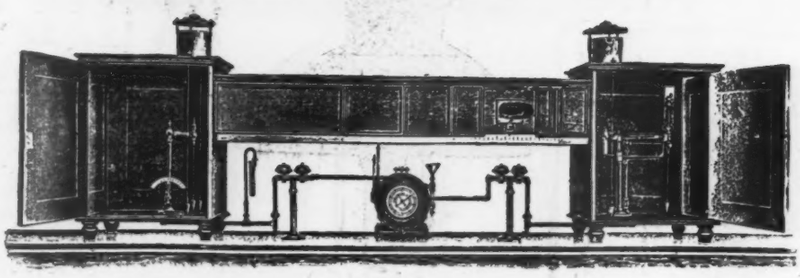
	Hrs.Min.
January	223.40
February	190.40
March	192.10
April	167.00
May	152.20
June	142.10
July	150.20
August	157.40
September	170.00
October	185.10
November	201.40
December	214.00
Total, yr.	2146.50



Sugg-Letheby Photometer For Dark Room.



Style B Photometer For Dark Room.



Closed Photometer For Light Room.

CIRCULARS SENT ON REQUEST.

PUBLIC LIGHTING TABLE.

JANUARY, 1906.

Day of Week.	Date.	Table No. 2. NEW YORK CITY. All Night Lighting. Light	Extinguish.
		P. M.	A.M.
Mon.	1	4.30	6.30
Tue.	2	4.30	6.30
Wed.	3	4.30	6.30
Thu.	4	4.30	6.30
Fri.	5	4.30	6.30
Sat.	6	4.30	6.30
Sun.	7	4.30	6.30
Mon.	8	4.40	6.30
Tue.	9	4.40	6.30
Wed.	10	4.40	6.30
Thu.	11	4.40	6.30
Fri.	12	4.40	6.30
Sat.	13	4.40	6.30
Sun.	14	4.40	6.30
Mon.	15	4.50	6.25
Tue.	16	4 50	6.25
Wed.	17	4.50	6.25
Thu.	18	4.50	6 25
Fri.	19	4.50	6.25
Sat.	20	4.50	6.25
Sun.	21	4 50	6.25
Mon.	22	5.00	6.25
Tue.	23	5.00	6.25
Wed.	24	5.00	6.25
Thu.	25	5.00	6.25
Fri.	26	5.00	6.25
Sat.	27	5 00	6.25
Sun.	28	5 00	6.25
Mon.	29	5.05	6.15
Tue.	30	5.05	6.15
Wed.	31	5.05	6 15

TOTAL HOURS DURING 1906.

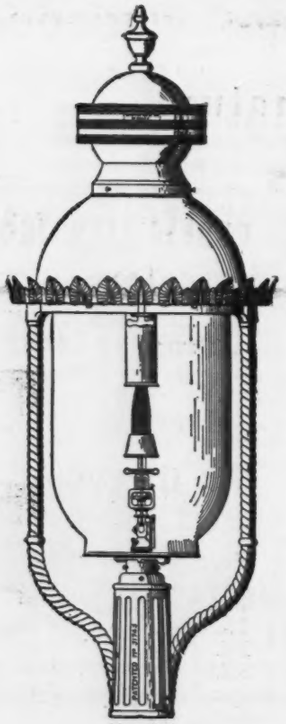
By Table No. 2.

	Hrs.Min.
January	423.20
February	355.25
March	355.35
April	298.50
May	264.50
June	234.25
July	243.45
August	280.25
September	321.15
October	374.30
November	401.40
December	433.45
Total, yr.	3987.45

NEW YORK, 318 West 42d Street. BOSTON, 820 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, 218 La Salle Street. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



No. 26.

Controls and Operates the

Welsbach System of Street Lighting,

Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

The Welsbach No. 6 Harp Fixture.

AN IDEAL LIGHT FOR DINING OR LIVING ROOMS.

THE HIGHEST MECHANICAL INGENUITY COMBINED WITH ORNAMENTAL BEAUTY--THE NEWEST OUTPUT FROM THE WELSBACH FACTORIES.

Equipped with new model No. 66 high candle power Welsbach Burner.

Side Pilot By-pass Tube covered with refractory sleeve to prevent bending.

Fourteen-inch Opal Dome Shade.

Polished Brass Embossed Crown 2¼ inches high.

Length of Fixture, 30 inches.

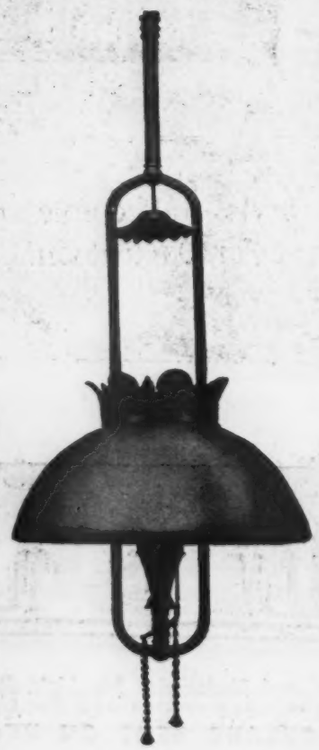
Width of Harp, 4½ inches.

Finished in Polished Brass.

Packed One Dozen to the Case.

List Price, per Dozen, $45 00.

We recommend equipping the No. 6 Harp Fixture with No. 4197 Intensive Brand Mantle, and the No. 306 **F. Q. M.** Clear Glass Air-Hole Cylinder.



Although the 14-inch Opal Dome Shade is standard equipment, we are prepared to furnish Dome Shades in green, pink or yellow (opal lined), and will be glad to quote prices.

WELSBACH CO.,

Salesrooms in all the principal cities of the United States.

Factories:

GLOUCESTER, N. J.
CHICAGO, ILL.

THE UNITED GAS IMPROVEMENT COMPANY

For the Period Ending July 1st, 1905, has been Awarded Contracts for 32 Sets of

Standard Double-Superheater Lowe Water Gas Apparatus.

PARTIAL LIST OF PLACES:

Catasauqua, Pa.	**Hempstead, N. Y.** (2d contract).	**Amsterdam, N. Y.**
Plattsmouth, Neb.	**Lansdale, Pa.**	**Houston, Tex.** (2d contract).
Detroit, Mich. (2d contract).	**New Britain, Conn.**	**Hamilton, O.** (2d contract).
Springfield, Ills.	**Ludington, Mich.**	**Indianapolis, Ind.** (2d contract).
Oneonta, N. Y. (2d contract).	**New York,** Mutual Co. (2d contract).	**Hazleton, Pa.**
Pottsville, Pa. (2d contract).	**St. Louis, Mo.** (4th contract).	**Mahanoy City, Pa.**
Evansville, Ind. (2d contract).	**Sioux City, Ia.** (3d contract).	**Nanticoke, Pa.**

TOTAL SETS TO JULY 1ST, 1905, ... 585
TOTAL DAILY CAPACITY TO JULY 1ST, 1905, . 455,980,000 CU. FT.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

Established 1858. Incorporated 1890.
CHAS. E. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas.
H. D. ABERNETHY, Sec.

J. H. Gautier & Co.

Greene & Essex Streets,
Jersey City, N. J.

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CLAY GAS RETORTS, FIRE CLAY TILES, FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

SOLE MANUFACTURERS OF THE

FLEMMING GENERATOR GAS FURNACE

Brooklyn Fire Brick Works,

OFFICE AND WORKS:
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MANUFACTURERS OF

CLAY GAS RETORTS & SETTINGS, GENERATOR LININGS. SPECIALTIES.

ST. LOUIS GAS CONSTRUCTION CO.,

DESIGNERS AND BUILDERS OF

COAL GAS BENCHES,

SPECIAL HIGH GRADE REFRACTORY MATERIAL FOR BENCH SETTINGS AND WATER GAS LININGS.

SOLE AGENTS FOR

CHRISTY SETTINGS.

CORRESPONDENCE SOLICITED.

ST. LOUIS, MO.

FIELD'S ANALYSIS FOR THE YEAR 1904.

An Analysis of the Principal Gas Undertakings in England, Scotland and Ireland. Being the 36th year of publication. Compiled and arranged by JOHN W. FIELD, Sec'y and Gen. Mgr. of The Gas Light and Coke Company, London. Price, $5. For Sale by

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ALBERT J. WEBER, President and General Manager.

Established 1846.

Adam Weber Sons.

Manhattan Fire Brick and Enameled Fire Clay Retort Works.

Works at Weber, on the Raritan River, Middlesex County, New Jersey.

GENERAL OFFICES:
Park Row Building, New York City.

Modern Coal Gas Benches,

With either Horizontal or Inclined Retorts, Half-Depth and Full-Depth Recuperative Furnaces.

ADAM WEBER PATENTS

STANDARD BENCH IRONWORK.

Linings for Water Gas Apparatus, High Grade Fire Brick of All Shapes and Sizes, Ground Fire Clay, Ground Fire Brick in Bulk or in Barrels.

ISAAC C. BAXTER, President.
Works.
LOCKPORT STATION, PA.

ESTABLISHED 1864.

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PETER YOUNG, Secretary and Treas.
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PITTSBURGH, PA.

Fire Clay Goods for Gas Works.

HENRY MAURER & SON,

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Clay Gas Retorts,

BENCH SETTINGS,

Fire Brick, Tiles, Etc.

GEROULD'S IMPROVED RETORT CEMENT.

A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

Price List, f.o.b. PITTSBURGH, PA.
In Casks, 400 to 800 pounds, at 5 cents per pound.
In Kegs, 100 to 200 " " 6 " "
In Kegs less than 100 " " 7 " "

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1200 Bank for Savings Bldg., Pittsburgh, Pa.

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MANUFACTURERS OF

Fire Brick, Tiles, Special Shapes, etc.

NEW YORK OFFICE:
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WORKS:
South River, N. J.

ESTABLISHED 1868.

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BALTIMORE, MD.,

Manufacturers of all Material for the Construction of Coal Gas Benches.

HALF AND FULL DEPTH AND FREE FIRING BENCHES,

All styles of which we have in operation, equipped with the BEST of LATEST IMPROVEMENTS, proving our claim for SUPERIOR QUALITY and EFFICIENCY.

INCLINES—We have in SUCCESSFUL OPERATION benches of Inclined Retorts, MANUFACTURED and ERECTED by us.

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Agents for New England States.

LARGE FACILITIES—Correspondence Solicited.
RAIL and WATER CONNECTIONS to ALL POINTS.

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Gas Retorts, Bench Settings, Fire Brick, Cupola Linings, Etc.

We are the **Exclusive Agents** *for the* **Mitchell Patent Benches,** *Constructed with Half or Full Depth Furnaces, to Burn either Coal or Coke, and Arranged for Front or* **Rear Clinkering.** **The Mitchell** *is the* **Original Coal Firing Bench.** *We also Erect Plain Benches with* **One** *to* **Six Retorts.**

YOUR CORRESPONDENCE IS RESPECTFULLY SOLICITED.

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Bronder Patent Stoking Machinery.

Three-Scoop and Three-Rake Charging and Discharging Machines are operating in New York, Newark, N. J., Philadelphia, Worcester, Mass., Mt. Vernon, N. Y., Toronto and Montreal, Canada.

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These are the only machines that will draw or charge simultaneously 3 or 4 retorts (vertically) and handle from 42 to 60 retorts in from 25 to 30 minutes, lid opening and closing and filling of furnaces included.

Hot Coke Conveyor, Quencher and Steam Exhauster, operating in Toronto, Canada, working in water-sealed flue, rollers being protected from heat and grit.

COAL CRUSHERS, CONVEYORS AND BINS. TURNTABLES FOR MACHINES.

Labor-Saving Machines for Handling Coal and Coke from Coal Cars to Coke Yard or Bins, a Specialty.

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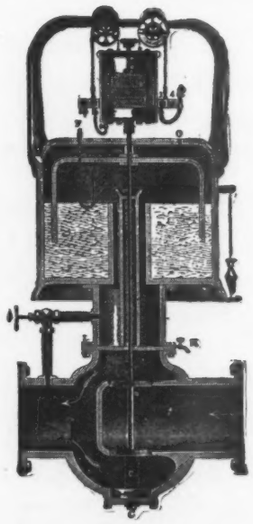

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COAL OR WATER GAS PLANTS,

Automatic, Balance, High Pressure and Service Governors,

Roots Improved Gas Exhausters,

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INSTALLATION OF SMOKELESS TAR BURNING SYSTEM,

Reinforced Concrete Construction for all Purposes,

Wide Experience in High Pressure Installation and Extension,

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For the Year 1904.

An Analysis of the Principal Gas Undertakings in England, Scotland and Ireland. Being the 36th Year of Publication.

COMPILED AND ARRANGED BY **JOHN W. FIELD,**

Secretary and General Manager of The Gas Light and Coke Company, London.

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STRICTLY High Grade. . . . .
Carefully Prepared.
For Gas Making or
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KELLER ADJUSTABLE COKE CRUSHER.
Strong, Simple, Durable. Will Crush any Size Desired.
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Mines situated on the Pennsylvania and the Baltimore and Ohio Railroads, in Westmoreland County, Pa.

POINTS OF SHIPMENT:
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Since the commencement of operations by this Company its well-known Coal has been largely used by the Gas Companies of New England and the Middle States, and its character is established as having no superior in gas giving qualities, and in freedom from sulphur and other impurities.

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THE SUN OIL CO.
Gas Oil, Gas Naphtha,
Refined Oil, Lubricating Oils.
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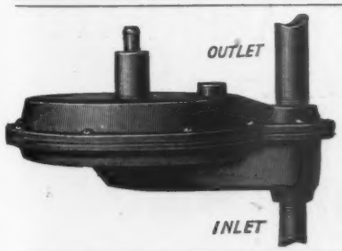

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Our Governors Reduce 30 or 40 Pounds Pressure to 2 Inches Water Pressure.
WE MAKE ALL SIZES OF
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Write for Catalogue and State what you Need.
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PRACTICAL HANDBOOK ON
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With Instructions for Care and Working of the Same,
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Translated with Permission of the Author, GEO. M. RICHMOND, M.E.
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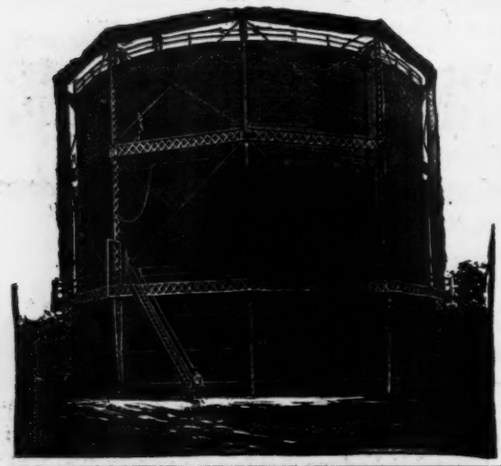

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Single, Double and Triple-Lift Gasholders of any Capacity. Tubular, Pipe and Sinuous Friction Condensers of all Sizes.

Steel Tanks for Gasholders, Iron Roof Frames and Floors, Purifying Boxes, Center Seal or Valve Connections, Bench Work, Reversible Lime Trays.

Self-Sealing and Pressed Steel Mouthpiece Lids.

Coke Barrows, Coal Wagons, and all Apparatus Requisite for a Complete Gas Works.

Also, Gas and Water Pipe, Flanged Pipe, Sugar House Work, and Special Castings of all Descriptions.

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Engineers and Manufacturers

APPARATUS FOR COAL GAS PLANTS,

SINGLE AND DOUBLE-LIFT GASHOLDERS AND STEEL TANKS,

Latest Improved

ROTARY EXHAUSTERS, P. & A. TAR EXTRACTORS, AMMONIA WASHERS,

CONDENSING, SCRUBBING AND PURIFYING APPARATUS.

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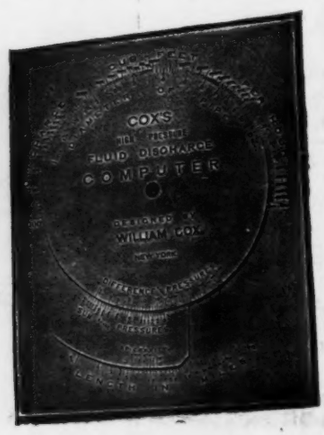

COX'S HIGH-PRESSURE FLUID DISCHARGE COMPUTER.

This Computer solves the following formula, which is applicable to Gas, Air and other elastic fluids, flowing through long pipes with high initial pressures:

$$\text{Discharge in cubic feet per hour at atmospheric pressure} = 33.3\sqrt{\frac{d^5 \times (p_1^2 - p_2^2)}{L \times w}}$$

Where d = diameter of pipe in inches,
p_1 = absolute initial pressure in pounds per square inch,
p_2 = absolute terminal pressure in pounds per square inch,
L = length of pipe in miles,
w = specific gravity of the fluid when air = 1.

To Find the Discharge from a Pipe and the Required Size of Pipe.

(1.) Set the specific gravity of the fluid opposite the length of pipe;
(2.) Bring the DIFFERENCE of the initial and terminal gauge pressures opposite the SUM of the initial and terminal gauge pressures;
(3.) Opposite any diameter of pipe will now be found the discharge in cubic feet per hour at atmospheric pressure; and
(4.) Opposite any desired discharge will also be found the required diameter of pipe.

Price of the Computers, in Cloth Case, 6½ x 8 inches, $5 Each, Net.

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BARTLETT, HAYWARD & CO.

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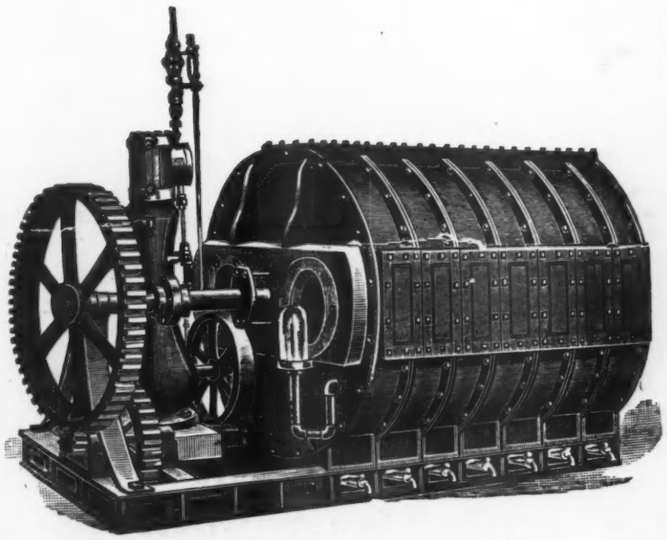
Designers and Builders of Gas Works.



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PATENT STANDARD WASHER-SCRUBBER.

The best apparatus for the extraction of all Ammonia and a large proportion of Carbonic Acid and Sulphureted Hydrogen. The Scrubber has been materially improved and is provided with patented Wooden Segmental Grids, instead of Metallic Disks, thus reducing the weight on shaft and power for operating same.

Coal and Water Gas Installations of the Most Modern and Complete Types.

BENCHES WITH INCLINED RETORTS.

System Stettiner Chamotte Fabrik, Actien Gesellschaft, of Stettin, Germany.

GASHOLDERS OF ALL SIZES.

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Complete Works Erected.

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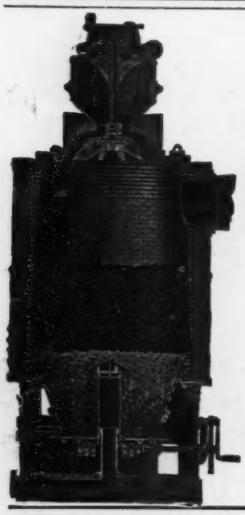
ADVICE AS TO EXTENSION AND RECONSTRUCTION OF GAS AND ELECTRICITY PLANT.

COMPLETE EXAMINATIONS MADE.
PROPERTIES PURCHASED.



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—BUILDERS OF—

Gas Power Plants with Producers,

The best Producers for either Bituminous, Anthracite Coal or Lignite. Less labor required and less waste than in any other Producer. Send for Pamphlet. : : : :

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HYDRAULIC TOOLS. HYDRAULIC OPERATING VALVES.

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ENGINEERS AND CONTRACTORS FOR THE

Construction and Extension of Gas Works.

TOTAL ROTARY AMMONIA SCRUBBERS SOLD:

129,556,000 Cubic Feet Daily Capacity.

TOTAL WALKER TYPE TAR EXTRACTORS SOLD:

40,100,000 Cubic Feet Daily Capacity.

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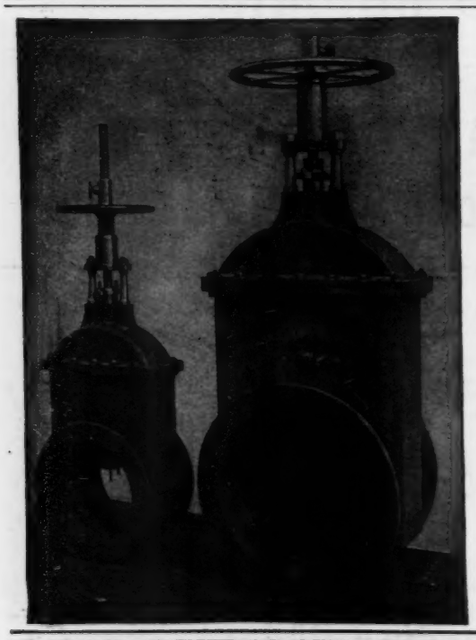

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Size.	8 Inches.	10 Inches.	12 Inches	16 Inches.	20 Inches.	24 Inches	30 Inches.	36 Inches.
Diameter of flanges.....	13 inches.	16 inches.	18 inches	22½ inches	27 inches.	3 inches.	3[illegible]½ inches	44 inches.
Face to face of flange...	12 inches.	12 inches.	12 inches	14 inches	17 inches	20 inches	21 inches.	23½ inches.

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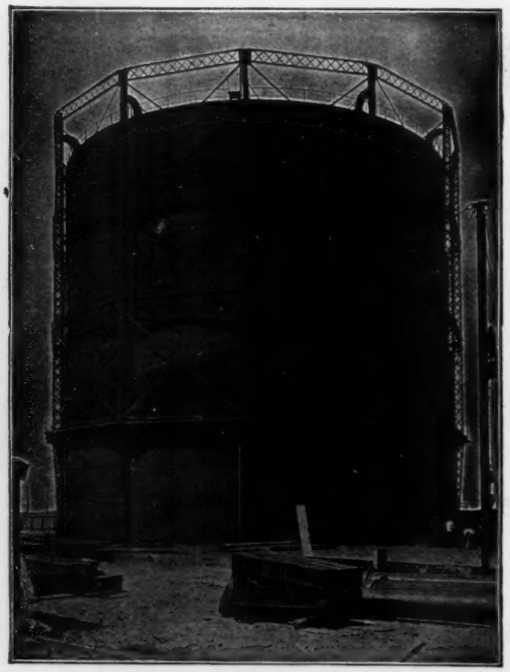

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EXCERPTS FROM DECISIONS

—OF THE—

BOARD OF GAS COMMISSIONERS of the COMMONWEALTH OF MASSACHUSETTS.

MR. E. H. YORKE, NEW HAVEN, CONN., Dec. 1, 1898.

Dear Sir: I am in receipt of a copy of "Excerpts from the Decisions of the Board of Gas Commissioners," which is a handy compilation in book form of extracts from the most recent decisions of the Gas Commission of Massachusetts.

I note that most of these extracts are broad and safe-guiding precepts, which apply with equal force to one Company as to another. The 13 years' existence of the Board of Gas Commissioners, with its unusual opportunities for acquiring information, have justly made it a high and safe authority in all matters pertaining to the management, obligations and rights of Gas Companies. Your little book will serve as a valuable reference library in settling legal complications which often arise between a Gas Company and its customers.

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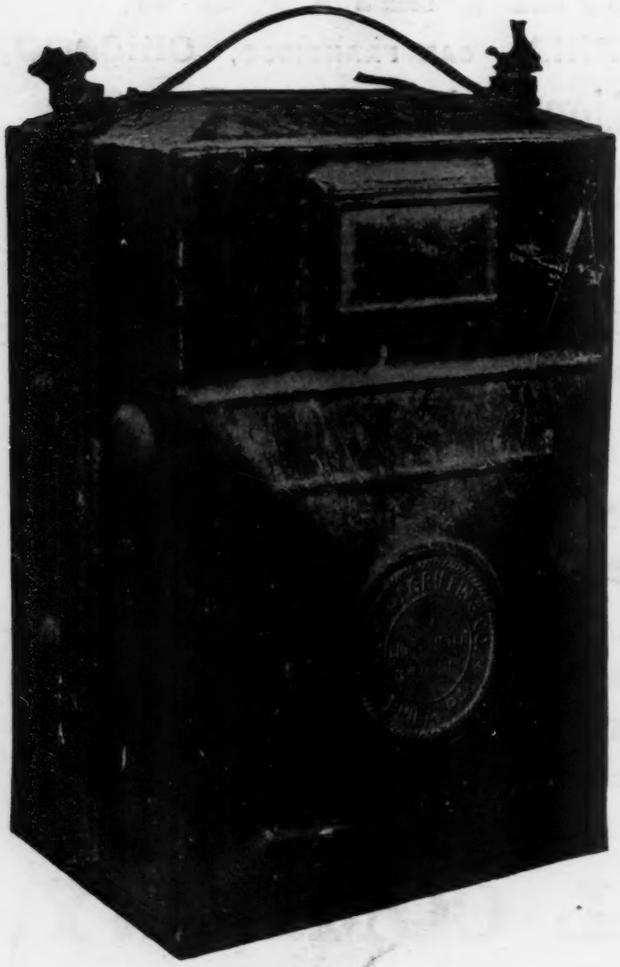

This is a photograph of a 3-light regular meter out of a lot of meters received from the Coatesville Gas Co., Coatesville, Pa., to be repaired and converted into prepayment meters.

AFTER.

This is the same meter after it has been repaired and converted into a new prepayment meter.

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